



southern  
utah  
wilderness  
alliance

RECEIVED

APR 24 2002

DIVISION OF  
OIL, GAS AND MINING

April 22, 2002

Mary Ann Wright  
Utah Division of Oil, Gas and Mining  
1594 West North Temple, Suite 1210  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801  
Fax (801) 359-3940

RE: New Permit Application, UtahAmerican Energy, Lila Canyon Mine C/007/013,  
Comments on the Administrative Completeness Determination and Request for  
Informal Conference

*Incoming*  
*C/007/013*  
*PM02B*

*Give Copy to*  
*JAY MARSHALL*

Dear Ms. Wright,

The Southern Utah Wilderness Alliance ("SUWA") submits these comments (pursuant to Rule 645.300.122.200) on the Utah Division of Oil, Gas, and Mining's ("Division") Determination that the UtahAmerican Energy Inc. ("UEI") new permit application package ("PAP") for the Lila Canyon Mine was "administratively complete." As set forth below, SUWA contends that the PAP is not administratively complete. Regardless, as stated in the Division's February 25, 2002, letter to UEI, this Determination means only "the application contains all information necessary to initiate processing and public review." We understand that the Determination does not mean that the Division has found that all data required by law has been submitted. Thus, the Division contemplates requesting and receiving additional information during its review for technical completeness and correctness, and the Division's administrative completeness Determination has only initiated the technical review process.

SUWA also requests that the Division hold an informal conference on the application for permit, and that such conference be held at the Division offices located in Salt Lake City. See R645-300-123.100, .120, .130. The comments below briefly summarize the issues SUWA intends to raise at the informal conference. R645-300-123.110. As allowed under the rules, our comments summarize the issues; they are not exhaustive for any particular issue, as SUWA

Monticello Office  
P.O. Box 401  
Monticello, Utah 84535  
Phone: 435-587-3636  
Fax: 435-587-2193  
Email: suwa@suwa.org

understands that the conference will provide an opportunity to address each issue in greater detail. The process of the informal conference alone may disclose other concerns, which can be addressed at that time or through additional comments submitted by SUWA during the Division's technical review process.

## **I. HYDROLOGY**

### **A. INCOMPLETE BASELINE INFORMATION**

1. *Acid- or toxic-forming materials.* Rule 624.300 of the coal mining rules ("Rules") require each applicant to collect samples from test borings or drill holes and analyze these samples for acid- or toxic-forming materials. Specifically, Rule 624.320 requires the applicant to perform "chemical analyses for acid- or toxic-forming or alkalinity-producing materials and their content in the strata immediately above and below the coal seam to be mined."

UEI's permit application does not contain any indication that such samples were collected and analyzed or any data reporting the results of any such analysis. In fact, UEI makes anecdotal statements about the absence of any "proven problem" with "acid-forming alkaline or toxic materials" at the Sunnyside mine and specifically asserts that "data" supporting its assertion is not included. Rule 624.300 is for "lands within the permit and adjacent areas," and Sunnyside satisfies neither criterion. More importantly, the requirement clearly must be met through submission of data, not anecdotes.

2. *Subsurface water resource maps.* Rule 722.100 requires submission of "cross sections and maps" showing the "location and extent of subsurface water," including the "areal and vertical distribution" of aquifers and portrayal of "seasonal differences of head." While UEI has identified both what it calls a "regional aquifer" and several "perched aquifers," it has not complied with this requirement.

3. *Surface water resources.* Rule 724.200 requires the applicant to submit "information on surface-water quality and quantity sufficient to demonstrate seasonal variation." The Rule further requires the collection, at a minimum, of baseline data on specified parameters for the water quality description and of "baseline information on seasonal flow rates" for the water quantity description.

For years, the Division has interpreted this Rule to require the submission of baseline information collected quarterly for a minimum of two years prior to permit issuance," Tech-004, and this requirement makes sense; only by the repeated observation of, and collection of data from, the surface water bodies in all seasons can the applicant satisfy the Rule's requirement of submission of data "sufficient to demonstrate seasonal variation." Sporadic data collection would not identify all seasonal variations, and collection of data for less than a year could mask important variations.

UEI has not submitted the required baseline data for either Lila Canyon or Little Park Wash, two intermittent streams within the permit area.

4. *Ground water quantity in the saturated zone.* UEI states that groundwater is present in consolidated bedrock. Rule 724.100 required the applicant to submit data on the "seasonal quality and quantity of ground water." Specific parameters must be measured with respect to ground-water quality, and quantity descriptions must include, at a minimum, "approximate rates of discharge or usage and depth to the water in the coal seam, and each water-bearing stratum above and potentially impacted stratum below the coal seam." As with surface water, the Division's own guidance (Tech-004) interprets this rule to require collection of baseline data quarterly for two years. UEI has, however, failed to submit data required under this rule:

- UEI provides no data on seasonal quantity of ground water from IPA-1, -2, and -3. These wells were sampled twice in 1994 (7 days apart), twice in 1995, and once in 1996 and 2001 (IPA-2 was also sampled once in 2000). This infrequent and sporadic sampling does not provide required data on "seasonal quantity" of ground water.
- UEI's description of the piezometric surface is clearly flawed in that it is depicted as a uniformly dipping planar surface over the entire permit area. UEI has, without justification or explanation, extrapolated to the six-square mile permit area on the basis of water level data in IPA-1, -2, and -3 covering only approximately one square mile. UEI also ignores known elevation points from the Horse Canyon mine, the effects of faults, and even *its own data* for the most recent levels shown in Appendix 7-1.
- UEI provides no information on the rates of discharge of ground water.
- UEI fails to address the effect of faults on the movement, discharge, depth, etc. of the ground water, although known east-west trending faults are clearly present in the permit area and noted in the application.



5. *Ground water quality in the deep saturated zone.* There are only four potential sources of information on water quality in the deep saturated zone – Redden Spring and IPA-1, -2, and -3. UEI has never collected or submitted a single sample from the IPA wells. One sample location is simply insufficient to comply with Rule 724.100.

6. *Ground water quality and quantity in the perched saturated zones.* The seeps and springs are in higher saturated zones, which UEI calls the “perched aquifers.” The only data submitted by UEI from the seeps and springs was (1) data collected in the fall of 1985 by JBR Consulting Group, and (2) data from a seep and spring survey conducted by EarthFax Engineering in 1993-1995. Only infrequent, sporadic data has been collected on the seeps and springs proposed for monitoring, contrary to Rule 724.100. Further:

- While the JBR report covers 19 seeps and springs, 9 are in the area of the Horse Canyon Mine and do not represent “pre-mining” baseline and another 9 are also outside the permit area. Only 1 spring is within the permit area (although located only 200 feet from the Horse Canyon Mine) and was not sampled by JBR. Thus, the JBR survey yields no pre-mining baseline data for the permit area.

- The EarthFax surveys summarized in Appendix 7-1 lists 60 seeps and springs. Of these, 35 are located outside the permit area, and 5 are in area of Horse Canyon Mine and do not represent pre-mining baseline. Only 14 are within the proposed permit area, and water quality data was collected at *only one* of these locations.

- Thus, UEI attempts to characterize baseline water quality in the 4,704 acre permit area with data from only one seep.

## **B. COAL MINE WASTE**

7. *Confusing/inconsistent references.* The application frequently refers to coal mine waste (a term defined to include waste-rock mixtures removed from underground workings) or underground development waste as “rock slope material,” a term the Rules do not define. The application does not specify exactly what this “rock slope material” is or how it will be handled.

8. *Location/extent of coal mine waste.* The application says, variously, that the coal mine waste will be disposed of in the refuse pile, will be used as structural fill material, and will be spread out and graded so as to be compatible with the natural surroundings. It is not clear if



these are three categories of waste or simply inconsistent treatment of the same waste. The volumes and weights of each category are not specified.

9. ***Treatment of coal mine waste.*** The application indicates that acid- and toxic-forming materials will be covered by four feet of fill upon reclamation. There is no indication of the volume of material to be covered in this manner or where the required fill material will come from. The reclamation plan states that approximately 44,201 cubic yards of material will be distributed over the 28 acre disturbed site prior to placement of topsoil. While the plan is not specific as to where re-grading will occur, if any of it involves coal mine waste found to be potentially acid- or toxic-forming, then such acid- and toxic-forming materials could be spread throughout the site and not covered with four feet of clean material.

10. ***Testing of coal mine waste.*** The application indicates that mine development waste will be tested three times (at the beginning, middle, and near completion of the project). Since the project is expected to last tens of years, this sampling is too infrequent to identify acid- or toxic-forming materials and allow them to be handled properly. Under this plan, it would be possible to place as much as 12,500 cubic yards of coal mine waste as "structural fill" without testing it for acid- or toxic-forming potential.

### C. **MINE WATER DISCHARGE**

11. ***No channel characterization.*** UEI proposes to discharge mine water into Lila Canyon channel (also referred to as the North Fork of Coleman Wash) in accordance with a UPDES permit yet to be obtained. UEI fails to include any qualitative or quantitative description of the channel below the proposed discharge point, so that it will be impossible to assess impacts of discharge on channel morphology.

12. ***Increased salinity.*** While UEI provides no information on ground water quality, the ground water brought up and discharged in this fashion will probably contain low TDS. The discharged water will flow for several miles over the Mancos Shale before draining into the Price River (and thence to the Green and Colorado Rivers). The Mancos Shale is highly saline, and the salts will be dissolved in the water before it drains into the Price River. Thus, the project will increase salinity in the Colorado River by an unquantified amount (directly in contradiction to the Colorado River Basin Salinity Control Program). UEI has made no attempt to assess this impact.

13. ***UPDES permit.*** As this is an application for a new mine permit, UEI must obtain a permit from the Utah Division of Water Quality, and other relevant agencies. The proper process must be followed, including UEI's filing of a notice of intent with all relevant up-to-date information, and a public review period.

#### **D. FLAWED WATER MONITORING PLAN**

14. ***Inadequate ground water monitoring.*** UEI proposes to monitor ground water from only 5 seeps and springs (L-6-G through L-10-G). While this plan is inadequate on its face, the problem is made worse by the facts that: L-6-G is a spring above Horse Canyon Mine, and there are no pre-mining baseline data for this spring; and L-8-G, L-9-G, and L-10-G are all located outside the permit area. Thus, there is only *one* proposed monitoring site in the permit area for which baseline data exists.

15. ***There is no baseline data for the surface water monitoring plan.*** By its terms (and consistent with its purpose), Rule 731.221 requires that monitoring compare operating data with baseline data on the required parameters. Where there is no baseline data, there can be no determination of impacts and no effective monitoring. Fortunately, since UEI acknowledges that Lila Canyon and Little Park Wash flow in response to snowmelt runoff in the spring and as the result of isolated summer thunderstorms, the required baseline data can easily be collected.

16. ***The plan does not address water quality in the deep saturated zone.*** In violation of Rule 731.211, UEI proposes to collect only water depth information, not water quality data, from the IPA-1, -2, and -3 boreholes, the only sites proposed for monitoring the deep saturated zone. Thus, the plan is totally devoid of any water quality monitoring in the deep saturated zone.

#### **E. FLAWED PHC**

17. ***UEI has not submitted required baseline data for the PHC.*** The Probable Hydrologic Consequences determination must be based on baseline data "collected for the permit application" and must include findings on whether adverse impacts may occur to the hydrologic balance. Rule 728.200. As noted above, there are no baseline data on several required topics, because there is a complete lack of characterization of the movement of water in the deep saturated zone and complete failure to identify the discharge area. Without this information, UEI cannot hope to make reasonable "findings" about impacts to the (so far unknown) hydrologic balance. Further, even though Rule 728.320 specifically requires the applicant to include

findings on whether acid-forming or toxic-forming materials are present, the words "acid-forming" and "toxic-forming" never even appear in the PHC.

**18. Cumulative Impact Area.** We are concerned that UEI has not provided enough data on existing surface and ground water resources that the Division can establish a hydrologically reasonable CIA boundary. As discussed above, the area of outflow (discharge) from the deep saturated zone has not been identified. Because this zone will be intercepted and water removed from it, it is crucial that the CIA boundary be large enough to evaluate impacts that are likely to occur to the discharge area. The USGS has prepared a cross section that is a more accurate portrayal of the deep saturated zone than any information provided in the PAP (see Exhibit A). As this USGS cross section indicates, in the topographic setting of the Lila Canyon Mine, the discharge area of the deep saturated zone would be Range Creek. As considerable published literature demonstrates, the interception of mine water would lower the base flow along stream reaches, which minimum flow is important to the biological resources in the Range Creek drainage. We are especially concerned because, by failing to identify the discharge area, UEI has also failed to monitor the pre-mining conditions, and thus will have no basis for evaluating impacts.

SUWA has attached a declaration and expert report of Elliott W. Lips that further explains many of the points raised above. See exhibit B. The declaration and attached expert report was prepared for Petitioner's Request for Agency Action in the matter of the Division's approval of the Lila Canyon Significant Permit Revision C/007/013 - SR98(1), and includes comments regarding the Division's technical review in that matter. Although SUWA recognizes that no technical analysis has occurred here yet, the declaration and report contain relevant information that will be helpful to the Division during its technical review process.

## **II. ENGINEERING PLAN**

**19. Inadequate description of construction, operation or use, and reclamation.** SUWA is concerned with the construction, operation, use, and reclamation of the various facilities and workings. No surface disturbance or facilities should be located on lands of wilderness character. Should the proposed mine, or some alternative to the proposed mine, contemplate surface disturbance and/or facilities within such lands, mitigation measures should



be applied to reduce conflict with wilderness land use and its supplemental qualities (including wildlife, vegetation and water sources). Of course, upon completion, facilities must be removed and disturbance reclaimed using the performance standard compatible with a wilderness land use.

At a minimum, mitigation measures should include: camouflaging the facilities, vehicles, and equipment; noise control; and light control. No nighttime operation should be permitted, as the noise and would have a disproportionate impact at night. Human safety risks and wildlife impacts from equipment operation and vehicle use would also increase at night.

Further, the PAP needs to identify future potential disturbances and facilities (including ventilation structures, fans) along with access to these facilities. Surveys, plans, and analysis of the impacts of constructing (blasting, heavy equipment, etc) such potential facilities must be included in the PAP.

20. *Subsidence and repair of damage.* The PAP states that "no attempt will be made to prevent subsidence in any area except where the escarpment near the outcrop is to be protected." SUWA is concerned that subsidence will impact other areas and resource values (including water and vegetation) that exist throughout the proposed permit area and the affected area. The PAP should include prevention measures to protect these resources. In regards to repairing damage to surface lands resulting from subsidence (or other mining activities), the PAP ignores the fact that UEI proposes to mine beneath the Turtle Canyon WSA and the Desolation Canyon wilderness inventory unit. No mechanized equipment would be permitted in these lands to "repair" surface damage. Therefore, the PAP should explain how it will prevent such damage, and, in the event damage occurs, how UEI intends to repair the damage. Increased costs should be reflected in the reclamation cost estimates and bonding requirements.

21. *Outdated Reclamation Cost Estimate.* The reclamation cost estimate (Appendix 8-1) states that costs have been estimated based on "Means Heavy Construction Data", 14<sup>th</sup> Annual Edition, 2000 and the "Caterpillar Performance Handbook", 30<sup>th</sup> Edition, October 1999. Using two to three year old handbooks does not provide an accurate estimate of current costs for reclamation.

22. *Clearly erroneous estimates.* The earthmoving portion of the estimate states that approximately 44,201 cubic yards of material will be distributed over the 28 acre disturbed site and that an additional 61,000 cubic yards of topsoil will be replaced. The cost to load and haul

these materials is estimated to be \$104,088 for the grading (44,201 cubic yards) and \$104,088 for the topsoil placement (66,000 cubic yards). These two identical entries for two very different tasks are clearly a duplication; one or the other task has not been estimated. Thus, the proposed reclamation cost estimate and bond amount does not reflect actual costs.

### III. SOILS

23. *Insufficient topsoil for reclamation.* SUWA is concerned that the minimum of 18 inches of topsoil for reclamation cannot be met under the current plans. UEI should be required to identify a suitable site to obtain topsoil of the proper quality and quantity should there be an insufficient amount on site. If necessary, additional physical and chemical analyses, field-site trials, or greenhouse tests should be performed. A sufficient bond should also be required in case additional topsoil must be imported.

24. *Subsoil.* A subsoil stockpile should be required. Further, the reclamation grading sequence is not consistent with the current plan to not require a subsoil stockpile.

### IV. BIOLOGY

Rules 645-301-310 to 313 require an applicant to describe the vegetative, fish and wildlife resources within the permit and adjacent areas; this description becomes the baseline for evaluating potential impacts. Rule 645-301-358 charges the applicant to use the best technology currently available. Only then can mitigation measures be identified as required for implementation into the operational plan and the design of the reclamation plan to restore or enhance the environmental resources, including habitat, that support species for postmining use. R645-301-311, 330, 340.

The rules require site-specific information regarding special status species, and habitats of unusually high value such as unique water sources and riparian zones. R645-301-322.200, .210, .220. The PAP, however, fails to submit necessary vegetative and wildlife information on all lands and habitats potentially affected by operation of the mine.

## **A. INADEQUATE VEGETATIVE INFORMATION**

25. ***Lack of current data for entire area.*** New vegetation baseline data must be collected using the best technology currently available. The vegetation information in the PAP is 12 to 20 years old and does not include an area of 400 acres that lies between these dated study areas. The PAP's bald statement that "the south face of the Bookcliff is very similar throughout the entire area," does not comply with the regulations and is not true for the area. Cryptobiotic soil crusts are prolific throughout the proposed surface site, but are not sufficiently addressed. In regards to special status plant species, timely surveys for all potentially occurring species must be conducted throughout the entire affected area by qualified individuals. See exhibit C, Declaration of Dr. Ron Kass (prepared for Petitioner's Request for Agency Action, in the Division approval of Lila Canyon Significant Revision C/007/013 - SR98(1), involving similar issues); see also exhibit D, selected pages from the *Utah Endangered, Threatened and Sensitive Plant Field Guide, 1991*. Therefore, data must be collected over the entire affected area, including seeps and springs, the Range Creek drainage, and the Price River drainage.

26. ***Failure to address subsidence adequately.*** The Rules require a description of the anticipated impacts of subsidence on renewable resource lands and how such impact will be mitigated. R645-301-332. In discussing subsidence, UtahAmerican states that "[n]o negative impacts to vegetation are anticipated," and explains that it will respond to any loss or diminished vegetation with a corrective mitigation plan. III-14. This fails to comply with the regulations, as UEI has ignored the many seeps and springs present in the permit area and has not provided a baseline inventory of the species dependant on these critical water sources. SUWA is concerned that subsidence will dewater seeps and springs that support unique vegetative communities and that no mitigation plan could correct this impact. Further, the PAP incorrectly states that "[t]here are no wetlands and / or riparian areas within the area of potential disturbance." III-45.

27. ***Reclamation.*** Vegetation reclamation must not involve the use of chemical agents to control weeds, insects, or animal species. No lethal means should be employed to "control" wildlife. Further, the site must be reclaimed to premining conditions, in this case wilderness. Therefore, all reclamation activities must meet this performance standard.

## **B. INADEQUATE WILDLIFE INFORMATION**



28. ***Absence of site-specific resource information.*** The PAP does not contain the site-specific resource information required by the rules, and the information presented in the PAP is not sufficient to design a protection and enhancement plan. R645-301-322.

29. ***Failure to address potential flycatcher impacts.*** The PAP fails to assess potential impacts to the southwestern willow flycatcher and its habitat. The PAP states that [t]here are no perennial water sources or riparian areas in either the current permit area or the proposed addition." PAP III-5. However, SUWA is concerned that the mine will impact Range Creek, which is a perennial stream, and also the seeps and springs that support southwestern willow flycatcher habitat. Therefore, further study is required.

30. ***Sensitive, threatened, and endangered species surveys need to be updated.*** Surveys need to be current and performed appropriately.

31. ***Failure to address special status fish species.*** The PAP also fails to consider affects to special status fish species (including the Colorado squawfish, Bonytailed Chub, Humpback Chub, and Razorback Sueker), again by incorrectly determining that "there are no perennial streams" in the area. PAP III-11. Range Creek, however, is a potentially affected perennial stream. Further, potential impacts on these fish and other aquatic species from increased salinity in the Price River (Upper Colorado River drainage) due to mine discharge, and/or reduced baseflow to Range Creek, has been totally ignored.

32. ***Failure to address amphibians and reptiles.*** The PAP fails to address amphibians and reptiles to the degree required under the rules. Amphibian species may occur within the unique habitat areas, especially among the various seeps and springs, and at Range Creek. SUWA is concerned that snake dens will be impacted by subsidence. Snake dens must be surveyed for, and protection ensured.

33. ***Failure to address high value wildlife habitats.*** Other high value wildlife habitats are given little scrutiny. UEI states, with no support, that "[t]he operational activities at the site impact the wildlife slightly, but most of the wildlife in the area will either accept or adjust their behavior to coexist with the operation." PAP III-17 (emphasis added). This dismissive statement does not satisfy the rules. See R645-301-322.220; PAP III-9, Table 3-2.

34. ***Mitigation is inadequate, under-analyzed, or undesirable.*** SUWA is concerned that wildlife will be displaced from this unique habitat, and that the mitigation measures are either insufficient or actually undesirable. For instance, because the proposed mine would

dewater seeps and springs, the band of Bighorn Sheep that rely on these unique water sources would be displaced. The construction of "guzzlers" as a form of mitigation may not be successful and may cause direct or indirect impacts on other land uses. Also, although the PAP says that produced water would benefit wildlife, there is no confirmation that water will be available or that wildlife will use it. Although labeled a positive effect, prolonged use of the winter range may have adverse effects on the area vegetation and must be analyzed. PAP III, 20. Further, what is the "prescribed manner" for removing petroleum and other contaminants from the stored water?

35. *Impacts of the coal haul road on wildlife.* SUWA is deeply concerned about the direct, indirect and cumulative impacts to wildlife due to the coal haul road constructed for this proposed mine. These impacts must be addressed and mitigated in the plan, and include habitat fragmentation (including increased use of the area in general), noise, and direct deaths by collision. These concerns are especially valid since vehicles and trucks would travel directly through Rocky Mountain Bighorn seasonal habitat, critical yearlong Mule Deer habitat, and yearlong Pronghorn habitat. However, the road will also have grave impacts to raptors, small mammals and lizards.

36. *Vehicles and haul truck time restrictions.* Vehicles and haul trucks should not be permitted to operate during dawn, dusk, and night hours. This restriction is the only mitigation that will truly protect wildlife from direct mortality.

37. *Inadequate monitoring.* Monitoring should be required for all key wildlife species, not only raptors. PAP III-18-19.

## **V. LAND USE**

### **A. WILDERNESS**

38. *Failure to restore to quality capable of supporting wilderness designation.* The rules require that a PAP contain an analysis of the land capability before coal mining and reclamation operations and further require that all disturbed areas must be restored, at a minimum, to the land uses that they were capable of supporting before mining, if not higher or better uses. R645-301-411.100, .120; see also 645-301-412. The permitted area overlaps lands of wilderness character (see exhibit E), however the PAP fails to include information necessary

to ensure that all disturbed areas will be restored to a quality capable of supporting wilderness designation, and the "performance standards" do not contemplate such use.

**39. Inadequate restoration.** In addition, and as discussed above, the PAP fails to ensure that water sources and other wildlife habitats (which are critical to the existing land uses, including wildlife, supplemental wilderness values, and grazing) will be adequately protected and restored to their pre-mining condition. Therefore, the application fails to demonstrate that the land will be returned to its premining land use capability. 645-301-414.

**40. Cultural.** Has SHPO issued a determination of No Historic Properties? A cultural survey must also be performed for all areas where subsidence is a possibility, and for all locations where wildlife and other "mitigation" measures are proposed.

**41. Air Quality.** As this is an application for a new mine, UEI must obtain an air quality permit from the State of Utah, Division of Air Quality. A notice of intent must be submitted and evaluated, and a 30-day public comment period provided.

Air quality in the area of the proposed mine, and in the region, has steadily and dramatically degraded over the past few decades. Views exceeding 100 miles were at one time common; visibility is now less than one-half what was normal in the past. Much of the air pollution can be attributed to the power plants at Hunter, Huntington, Bonanza, and Craig, and a general increase in the burning of fossil fuels within and beyond the region.

The State of Utah must manage actions to meet air quality standards prescribed by federal, state, and local laws. Protecting air quality should be a priority – not just an afterthought done if convenient or "feasible." Therefore, the Division should take a proactive approach to managing air quality by, among other things: gathering baseline air quality data; setting aggressive standards; analyzing the cumulative impact of any proposed action with other past, present, and reasonably foreseeable actions; establish an effective monitoring program; and halting any actions that contribute to air pollution if such monitoring reveals that standards have been exceeded. It should not ignore the connection between the underground mining of coal, the air contaminants created by such mining and hauling, and the burning of the coal at a coal fired power plant.



## VI. SIGNIFICANT REVISION

42. *The proposed mine must be processed and approved through application of a new permit.* Rule 645-303-222 provides that any "extension to the approved permit area" must "be processed and approved through application for a new permit" and may not be processed under sections 221-228. The Board's Order states that "the Division is directed to process the permit as a new permit."

We are perplexed by the Division's stance. While internal file documents demonstrate the Division intends to use the procedures for a new permit in its review, the application is being processed as a revision or reissuance to the Horse Canyon Mine permit. The Rules clearly contemplate application for, and issuance of, a "new permit." "Using the procedures for a new permit" is not the same as issuing a new permit; a "revision to an existing permit" is not the same thing as issuance of a new permit.

In fact, UEI has not applied for a new permit, and the Division is not reviewing the application in contemplation of issuing a new permit. Rather, UEI has requested, and the Division contemplates issuing, an extension, labeled "Part B," to the existing Horse Canyon Mine Permit. This does not comply with the Division's rules.

It is also clear that the public has not been effectively notified of the impending processing of a new permit for a completely new mine three times the size of the Horse Canyon Mine. The public has been notified only of an "extension" to the existing Horse Canyon Mine, one of a series of scores or hundreds of notices about renewals, time extensions, and other small or administrative changes to the familiar Horse Canyon Mine. Beyond the opaque assertion that this particular action is being processed "as" a new permit, for reasons not explained, there is nothing in the ad's wording that would actually notify the public that a new mine is contemplated. Only a "meets and bound" description is provided of the "extension," which will convey meaningful information only to a surveyor or geologist.

## VII. ROAD

43. *The coal haul road must be included as part of the permit area.* UEI proposed to construct a new road to its surface facilities, which construction it proposes to accomplish through surveying, grading, filling, etc. Regardless of any other users of the existing track, the new construction is proposed by UEI and will benefit only UEI. The road should be considered as part of the permit area. The area of grading, filling, and other construction activities will clearly be disturbed area. The PAP contains no treatment whatsoever of the potential impacts of this significant construction activity: no baseline description of existing hydrological or biological resources, no proposed monitoring, and no proposed reclamation.

## VIII. LEGAL

44. *Unsuitable for mining.* The proposed permit area is unsuitable for mining. Mining in the proposed permit area would, at a minimum, affect productivity of water supply, scientific and aesthetic values, and natural systems.

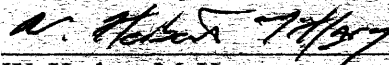
45. *Impossible schedule.* UEI's schedule is unrealistic and fails to account for the necessary data gathering, technical review, and public process. UEI anticipates beginning surface disturbing actions in June, 2002. At this time, the most aggressive start date could be no sooner than sometime in the summer of 2004, assuming all the necessary baseline data is collected. Further, any schedule would have to recognize wildlife and other resource conflicts. [Herb – why apologize? None of this is YET through any fault of the Division.]

46. *Bonding and Insurance.* Bonding and insurance would have to be a sufficient amount to cover reclamation to the current land-use capability, which is wilderness. Therefore, the amount would have to cover restoration of any lost water sources to their natural state, rehabilitation of the vegetation to the natural plant communities, and contouring any disturbed rock and soil to its natural appearance.

47. *Right-of-way still in dispute.* As of today, the Interior Board of Land Appeals has not reached a decision on the disputed right-of-way.

SUWA appreciates your time in considering these comments and looks forward to working with the Division at the informal conference and during the technical review process. Please contact me if you have any questions.

Sincerely,



W. Herbert McHarg  
Southern Utah Wilderness Alliance

**CERTIFICATE OF MAILING**

I hereby certify that on April 22, 2002, I caused a true and correct copy of the foregoing Comments on Administrative Completeness for the Lila Canyon Mine PAP and Request for Informal Conference, to be sent by facsimile and certified mail return receipt to the following:

Mary Ann Wright  
Utah Division of Oil, Gas and Mining  
1594 West North Temple, Suite 1210  
P.O. Box 145801  
Salt Lake City, Utah 84114-5801  
Fax (801) 359-3940

*Courtesy copy mailed first class to:*

Denise A. Dragoo, Esq.  
SNELL & WILMER  
15 West South Temple, Suite 1200  
Gateway Tower West  
Salt Lake City, Utah 84101





## **Exhibit A**

# The Ground-Water System and Possible Effects of Underground Coal Mining in the Trail Mountain Area, Central Utah

*By* Gregory C. Lines

Prepared in cooperation with the  
U.S. Bureau of Land Management

U.S. GEOLOGICAL SURVEY WATER-SUPPLY PAPER 2259

DEPARTMENT OF THE INTERIOR  
WILLIAM P. CLARK, Secretary

U.S. GEOLOGICAL SURVEY  
Dallas L. Peck, Director



UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON: 1985

---

For sale by the Branch of Distribution  
U.S. Geological Survey  
604 South Pickett Street  
Alexandria, VA 22304

**Library of Congress Cataloging in Publication Data**

Lines, Gregory C.

The ground-water system and possible effects of underground coal mining in the Trail Mountain area, central Utah.

(Geological Survey water-supply paper 2259)

"Prepared in cooperation with the U.S. Bureau of Land Management."

Bibliography 32 p.

Supt. of Docs. No.: I 19.13:2259

1. Water, Underground—Utah—Wasatch Plateau. 2. Coal mines and mining—Environmental aspects—Utah—Wasatch Plateau. I. Title. II. Title: Trail Mountain area, central Utah. III. Series.

CB1625.U6L368 1985

553.7"08792563

84-400063

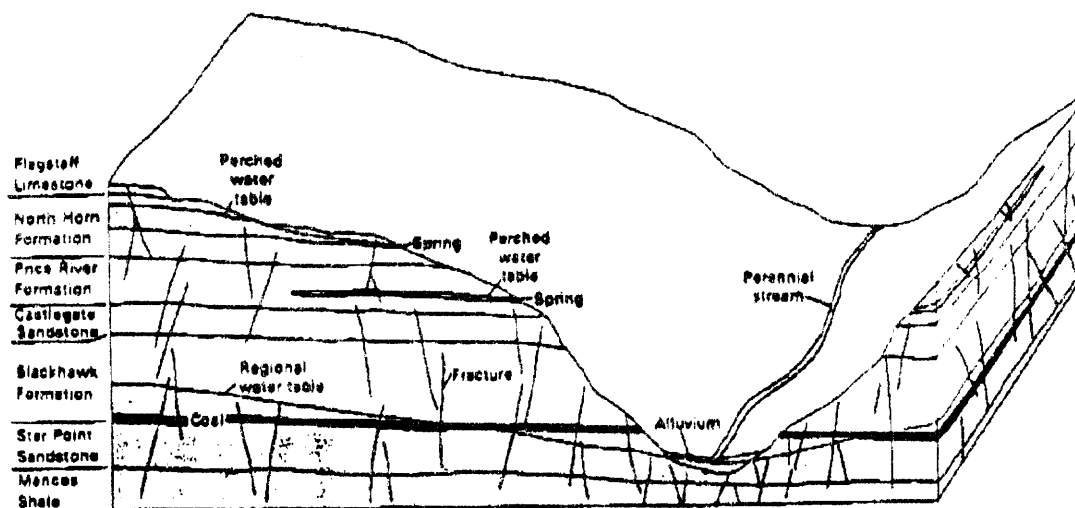


Figure 8. Generalized block diagram showing occurrence of ground water.

Table 3. Laboratory determinations of porosity and hydraulic conductivity of core samples from well (D-17-6)27bda-1

[Determinations by Core Laboratories, Inc., Dallas, Texas]

Lithology: Sh, shale; Slt, siltstone; Ss, sandstone; f, fine grained; m, medium grained.

Hydraulic conductivity: 1, impermeable to water even at a pressure of 5,000 pounds per square inch.

Geologic unit	Lithology	Depth below land surface (feet)	Porosity (percent)	Hydraulic conductivity (feet per day)	
				Horizontal	Vertical
Blackhawk Formation	Ss, f	1,521	14	$1.5 \times 10^2$	$3.7 \times 10^3$
	Slt	1,545	3	$9.3 \times 10^4$	$1.2 \times 10^7$
	Sh	1,786	2	1	1
	Ss, f	1,792	14	$1.1 \times 10^2$	$3.9 \times 10^3$
	Sh	2,170	4	$1.1 \times 10^4$	---
	Slt	2,265	2	$2.0 \times 10^7$	$2.2 \times 10^4$
Star Point Sandstone	Ss, m	2,466	17	$3.1 \times 10^2$	$1.1 \times 10^2$
	Ss, m	2,493	11	$1.5 \times 10^2$	$6.6 \times 10^3$

laboratory determinations, listed in table 3, indicate a large variation in both porosity and hydraulic conductivity. Porosity of sandstone samples ranged from 11 to 17 percent, and hydraulic conductivity ranged from  $3.7 \times 10^3$  to  $3.1 \times 10^4$  ft/d. Horizontal hydraulic conductivities of all sandstone samples were greater than vertical hydraulic conductivities, but the differences were less than one order of magnitude. Porosity of the finer grained siltstone and shale samples ranged from 2 to 4 percent, and hydraulic conductivity ranged from  $1.1 \times 10^4$  to  $2.2 \times 10^7$  ft/d. One shale sample was effectively impermeable to water even at a pressure of 5,000 lba/in<sup>2</sup>. Unlike the sandstone samples, vertical hydraulic conductivities of the two siltstone samples were greater than the horizontal hydraulic conductivities.

Aquifer tests were conducted at five wells on Trail Mountain, and the results are summarized in table 4. No observation wells were available for the tests, and recovery in the discharge wells are used to compute transmissivity. A constant-drawdown test (Lohman, 1972, p. 23-26) also was conducted at well (D-18-6)4bac-1, which flowed at the land surface. An expandable packer was used in wells (D-17-6)27bda-1 and 34 dda-1 to isolate various zones for testing.

None of the test wells fully penetrated the Blackhawk-Star Point aquifer, and the transmissivity values in table 4 probably are most representative of the transmissivities of those parts of the aquifer open to the wells. Some transmissivity values computed from the tests agree fairly well with what would be expected from hydraulic conductivities determined



## **Exhibit B**

**BEFORE THE BOARD OF OIL, GAS AND MINING**  
**DEPARTMENT OF NATURAL RESOURCES**  
**STATE OF UTAH**

In the Matter of the	)	
Request for Agency Action	)	
By Petitioner Southern Utah	)	Docket No. 2001-027
Wilderness Alliance Regarding the	)	
Division of Oil, Gas and Mining's	)	
Approval of the Lila Canyon	)	Cause No. C/007/013-SR98(1)
Significant Permit Revision	)	
C/007/013-SR98(1)	)	
Filed by UtahAmerican Energy, Inc.	)	

**DECLARATION OF ELLIOTT W. LIPS**

My name is Elliott W. Lips. I am of over twenty-one years of age, of sound mind, capable of making this declaration, and I am personally acquainted with the facts herein stated.

1. The attached document, Expert Report of Elliott W. Lips, is incorporated by reference as if fully stated herein.
2. If sworn as a witness, I could testify to the facts and opinions stated in this declaration.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on November 26, 2001

  
\_\_\_\_\_  
Elliott W. Lips

## CURRICULUM VITAE

Elliott W. Lips  
2241 East Bendemere Circle  
Salt Lake City, Utah 84109  
Phone (801) 487- 8473  
e-mail: elips@geog.utah.edu

### SUMMARY OF EXPERIENCE

Mr. Lips is a registered professional geologist with 18 years experience in engineering geology and reclamation planning and implementation. He has conducted research, consulted, and taught university classes on geologic hazards, Earth surface processes, natural resource management, mine reclamation and permitting, and environmental studies. Mr. Lips is currently a consulting engineering geologist and an Adjunct Associate Professor at the University of Utah.

### ACADEMIC AND PROFESSIONAL QUALIFICATIONS

Ph.D. A.B.D., Geography, University of Utah, Salt lake City, Utah  
M.S., Geology, Colorado State University, Fort Collins, Colorado, 1990  
Graduate courses in Engineering, University of California, Berkeley, 1984-1985  
B.A., Geology and Physics, Western State College, Gunnison, Colorado, 1983  
Registered Professional Geologist, State of Wyoming No. 1489

### PROFESSIONAL HISTORY

University of Utah, Adjunct Associate Professor, 1999 - Present; Adj. Assist. Professor, 1996 - 1999

Responsibilities include developing curriculum and teaching courses on geomorphology and surficial processes, geologic hazard evaluations, environmental studies, and natural resource management.

Great Basin Earth Science, Inc., Engineering Geologist and President, 1995 - 2000  
Responsible for all aspects of providing consulting services for geologic hazard evaluations, surface and ground water investigations, stream restoration, and geologic/seismic dam safety evaluations.

AGRA Earth & Environmental, Engineering Geologist, 1992 - 1995  
Project manager for engineering geologic and geologic hazard investigations including faults, landslides, floods, and debris flows. Projects were for existing, proposed, and reclaimed mines, proposed subdivisions, utility corridors, commercial developments, and dams.

JBR Consultants Group, Engineering Geologist, 1985 - 1992  
Project manager for mine permitting and reclamation projects throughout the western United States. Prepared Plans of Operations, Environmental Assessments, reclamation plans, and state permitting documents for proposed and existing mining operations as well as for abandoned mines.

U.S. Geological Survey, Geologist, 1983 - 1985

Conducted research on landslides, floods, and debris flows in the western U.S. Prepared publications on processes, recent events, methods of evaluations, and methods of risk assessment.



## RESEARCH AND CONSULTING EXPERIENCE

### Stream Channel Restoration Designs

Stream Channel Stability Evaluations and Design, Salina, Utah: Conducted an evaluation of two stream channels at a reclaimed mine site that had been damaged by high-runoff events. Channel stability was evaluated by considering the geomorphic setting, previous channel designs, stable upstream reaches, and examples from the literature. Prepared designs for reconstruction of the channels incorporating a series of buried grade control structures. Provided assistance in permitting the design and developed a program for construction supervision.

River Restoration, Carbon County, Utah: Designed a realignment and restoration of a 1,500-foot reach of the Price River that had been impacted by coal mining. Reviewed peak flows for various return-interval events, evaluated geomorphic stability, flow hydraulics, sediment transport, aesthetics, wildlife habitat, and costs to develop designs for river and floodplain restoration. Developed several conceptual design alternatives for client review and rated each alternative based on effectiveness, costs, long-term stability, maintenance requirements, permit considerations, and constructibility.

### Surface and Ground Water Investigations

Investigation of Potential Sources of Seepage, Great Salt Lake Beach, Utah: Conducted an evaluation of seepage and beach saturation in a complex industrial and hydrogeologic setting. Investigation consisted of reviewing reports of previous investigations, conducting field investigations and surveys, conducting finite element seepage modeling of ground-water flow, and investigating surface-water management of nearby water sources.

Ground Water Contamination Investigations, Western United States: Conducted approximately 15 investigations for ground water contamination from mines, mills, smelters, tailings ponds, and other industrial facilities in Utah, Colorado, Nevada, and California. Subsurface investigations consisted of developing and implementing drilling programs, constructing piezometers, collecting and analyzing water quality data, describing geologic and hydrologic site conditions, developing seepage models, and preparing reports.

Seep and Spring Investigations, Utah and Nevada: Performed four separate seep and spring surveys ranging in size between 2 and 50 square miles. Used aerial photographs, mapping, and water rights information to document known seeps and springs; conducted a field inventory of those known sources, as well as conducted a thorough reconnaissance of the study area to locate additional seeps and springs. Characterized the flow regime, water quality, habitat use, vegetation, and geologic source of each spring. Prepared reports describing occurrence, surface-ground water relationships, and relationship of water quality to geologic source.

Runoff and Sediment Control Plans, Utah and Nevada: Performed the hydrology and hydraulics analyses and designed integrated runoff control plans at numerous mine and industrial facilities ranging in size to 300 acres. Determined runoff volumes, peak flows, and sediment yield. Plans were developed that would: direct upgradient runoff from undisturbed watersheds through the sites; control runoff generated on the sites and prevent it from mixing with the undisturbed area runoff; minimize the potential for on-site runoff to contact pollutants; direct perennial seepage water

through the sites; and provide treatment for site runoff prior to its leaving the sites. Structures designed as part of these runoff control networks include earth-lined channels, riprap channels, biodegradable erosion control channel protection, water bars, drop structures, culverted road crossings, synthetic lined channels, spillways, and sedimentation ponds.

#### Erosion and Sedimentation Evaluations

Sediment Yield Evaluation, Grants, New Mexico: Determined the soil loss and sediment yield from an 8,000 acre area disturbed by open-pit uranium mining. Developed a site-specific model that considered soil loss contributions from sheetwash, rill, gully, and stream-bank erosional processes. Sediment yield was evaluated for existing, post-reclamation, and pre-mining conditions. To evaluate soil loss, the site was divided into 232 separate sub-basins, each representing a dump, stockpile, or other topographically and geologically distinct area. Sediment yield was evaluated at eight locations where drainages exited the mine site. The methodology was tested by comparing the estimated sediment yield to the measured sediment accumulation in a downstream reservoir.

Erosion and Sediment Transport Investigation, Central Utah: Performed field measurements in ephemeral channels to document channel erosion, deposition, and impacts from past mining activities. Measured and mapped erosion features on disturbed slopes and mine waste piles, and evaluated their potential as sediment source contributors to the watershed drainage network. Calculated expected erosion rates and volumes, and modeled sediment transported in the stream channels. Assessed historic downstream deposition of tailings material.

#### Reclamation Planning and Implementation

Mine Reclamation, Utah and Nevada: Prepared components of closure and reclamation plans for 21 open-pit and underground mines, mill and concentrator sites, smelters, and tailings impoundments. Components of the plans included: specifications for building and foundation demolition; detoxification and neutralization treatments; stability evaluations; cut and fill and regrading plans; topsoil source identification and placement requirements; and runoff and erosion control. Prepared bid-quality construction specifications, drawings, and cost estimates for these components as well as revegetation activities.

Wetland Mitigation Designs, Northern Utah: Conducted investigations and prepared wetland mitigation designs for three projects. The projects consisted of: calculating water budgets; investigating and assessing available water rights; determining water and soil requirements; preparing conceptual plans; and preparing final designs for the collection, conveyance, and distribution structures. The goals of the projects included creating new wetland areas, enhancing adjacent marginal wetland areas, and supporting integral upland niches for diverse habitats.

#### Regulatory Evaluations

Environmental Impact Statement Review, Northern Utah: Conducted a review of a Draft EIS prepared by the Army Corps of Engineers for a proposed 5,000-acre expansion of a tailings impoundment. Key technical issues were potential impacts to surface and ground water, adjacent wetlands, and the Great Salt Lake. An extensive summary report was prepared identifying specific items that needed clarification and/or additional information.

Hydropower Project Permitting Review, Western Colorado: Conducted reviews of the Draft and Final EIS, the Army Corps of Engineers 404 permit application, and supporting technical documents for the proposed AB Lateral Hydropower Project. The proposed project would divert about 900 cfs from the Gunnison River to the Uncompahgre River. Evaluated the impacts to the Uncompahgre River and prepared detailed technical comments on potential changes to stream geomorphology from bed scour and bank erosion.

Dam Permit Application Review, Central Utah: Conducted a review of a Federal Energy Regulatory Commission (FERC) application for a proposed dam and hydroelectric power plant on the Fremont River, near Capitol Reef National Park. Prepared comments on the adequacy of the geologic, geotechnical engineering, and hydrologic investigations conducted as part of the application package, and potential impacts to the river within the park.

Environmental Assessment Review, Southern Utah: Conducted a review of an Environmental Assessment prepared by the BLM for a proposed chaining project on public and private land. Evaluated the geologic and hydrologic investigations conducted to support the impact assessment from sedimentation and erosion.

Mine Permit Application Review, Southern Utah: Conducted several reviews over a three-year period of mine permit applications submitted to the Utah Division of Oil, Gas and Mining (DOGM) for a proposed coal mine on the Kaiparowits Plateau. Evaluated the hydrology and geology sections of the permit application and prepared written comments on the adequacy of the baseline investigations, probable hydrologic consequences, monitoring plans, and impacts to surface and ground water.

Highway Design and Construction Review, Central Utah: Conducted reviews of design drawings, construction specifications, permit applications, and environmental documents during a three-year period of highway construction for U.S. 189 in Provo Canyon, Utah. Evaluated geologic and hydrologic components of the project and their compliance with NEPA and the Clean Water Act. Prepared numerous written documents based on site inspections, surveys, data analysis, and interpretation.

#### Geologic Hazards Evaluations

Landslide and Debris-Flow Hazard Evaluation, Central Utah: Evaluated the potential for debris flows and debris floods for a 30-mile portion of the Wasatch Front. Evaluated and rated more than 90 canyons in the project area for their potential to generate an event that could impact residential communities. Conducted reconnaissance of landslides and debris flows throughout central Utah during the period of high landslide activity in 1984. Provided reports to the Utah Geological Survey on conditions of landslides and debris flows that posed hazards, and provided 24-hour emergency assistance to City and County personnel by identifying and evaluating landslides, debris flows and flood hazards.

Geologic Hazards Evaluations, Utah and Wyoming: Evaluated site conditions at several residential lots, proposed subdivisions, and a proposed coal mine to assess geologic hazards including seismic hazards, surface and ground-water impacts, landslides, and collapsible soils. Reports have been prepared in support of obtaining approval for septic drain fields, building permits, and mining permits.

## Slope Stability Modeling

Sediment Pond Stability Evaluation, Salina, Utah: Conducted stability analysis and prepared hydraulic designs for an earth embankment of a sediment pond. Stability was evaluated for full-reservoir and rapid-drawdown conditions under static and pseudo-static scenarios. Based on these analyses, a new embankment was designed and a report was prepared including construction drawings for the embankment as well as for the primary and secondary spillway structures.

Landslide Analyses and Remediation, Central Utah: Conducted three separate analyses of recent landslides that occurred on a pipeline right-of-way, a reclaimed mine, and an active mine. Projects including detailed mapping of landslide features, conducting seismic profiles, installing borings and piezometers, collecting samples, conducting laboratory testing, and conducting computer stability analysis. Based on the analyses, developed remediation designs to increase stability by controlling surface and shallow ground water, and regrading the landslides to stable configurations.

## Seismic Hazard Evaluations

Liquefaction Analysis, Wasatch Front, Utah: Evaluated liquefaction potential for four sites along the Wasatch Front. Factors considered were presence and depth of liquefiable layer of loose sand identified from blow counts in previous geotechnical borings, depth of ground water, and horizontal acceleration of gravity resulting from an earthquake on nearby faults. Probability of liquefaction for specified periods of time, and the amount of settlement that would result was estimated at each site.

Fault Rupture Investigations, Western United States: Conducted aerial photo interpretation, low sun-angle aerial reconnaissance, drill log and core examination, topographic and stream channel profiling, and trench logging as part of investigations of normal and accommodation faults in Arizona, Montana, Nevada, and Utah.

Geologic/Seismic Dam Safety Evaluations, Utah: Performed investigations to determine geologic site conditions, geologic hazards, ground motion parameters, and liquefaction susceptibility for 12 separate dam sites throughout Utah for compliance with the Utah Statutes and Administrative Rules for Dam Safety. Projects have included subsurface investigations, geologic mapping, geologic hazards evaluations, fault evaluation, and determining ground motion parameters. Mean peak horizontal accelerations for design earthquakes were estimated by attenuating fault magnitude from nearby sources, frequency-magnitude relationships, and published probabilistic estimates.

## PUBLICATIONS

- Wieczorek, G. F., Ellen, Stephen, Lips, E. W., Cannon, S. H. and Short, D. N., 1983, Potential for debris flow and debris flood along the Wasatch Front between Salt Lake City and Willard, Utah, and measures for their mitigation: U.S. Geological Survey Open-File Report 83-635, 25 p., map scale 1:100,000, Reprinted in Utah State Bar, 1983, Conference on Legal and Legislative Approaches to Western States Geological Hazards: November 1983, Salt Lake City, p. 53-116.
- Lips, E. W., Wieczorek, G. F., and Boschetto, H. B., 1984, Factors influencing debris-flow runoff: Delineation of Landslides, Flash Floods and Debris Flow Hazards in Utah, Logan Utah, Abstracts, p. 9.



- Wieczorek, G. F., Ellen, Stephen, Lips, E. W., Cannon, S. H., and Short, D. N., 1984, Identification of debris flow and debris flood potential along the Wasatch Front between Salt Lake City and Willard, Utah: Delineation of Landslides, Flash Floods and Debris Flow Hazards in Utah, Logan Utah, Abstracts, p. 9.
- Keefer, D. K., Wilson, R. C., Harp, E. L., and Lips, E. W., 1985, Landslides in the Borah Peak, Idaho earthquake of 1983 in Reaveley, L. D., ed. The Borah Peak, Idaho Earthquake of October 28, 1983: Earthquake Engineering Research Institute Reconnaissance Report, p. 91-125.
- Lips, E. W., Ellen, S., and Wieczorek, G. F., 1984, Identifying debris flow and debris flood potential along the Wasatch Front between Salt Lake City and Willard, Utah: Geological Society of America, Abstracts with Programs, v.16, no. 6, p. 576.
- Lips, E. W., 1985, Landslides and debris flows east of Mount Pleasant, Utah, 1983 and 1984: U.S. Geological Survey open-File Report 85-382, 12 p., map scale 1:24,000.
- Lips, E. W., 1988, Grain size parameters of debris flows and hyperconcentrated flows, in Julien, P. J., ed., Essays on River Mechanics: Colorado State University, p. 15-26.
- Lips, E. W., and Keaton, J. R., 1988, Slope-a-scope: a convenient tool for rapid topographic profiling: Association of Engineering Geologists, Abstracts with Programs, p. 51.
- Wieczorek, G. F., Lips, E. W., and Ellen, S. D., 1989, Debris flows and hyperconcentrated floods along the Wasatch Front, Utah, 1983 and 1984: Bulletin of the Association of Engineering Geologists, v. 26, no. 2, p. 191-208.
- Lips, E. W., 1990, Characteristics of debris flows in central Utah, 1983: Fort Collins, Colorado, Colorado State University M.S. thesis, 66 p.
- Lips, E. W., and Wieczorek, G. F., 1990, Recurrence of debris flows on an alluvial fan in central Utah in French, R. H., ed., Hydraulics/ Hydrology of Arid Lands: American Society of Civil Engineers, p. 555-560.
- Keaton, J. R. and Lips, E. W., 1994, Why probabilistic estimates sometimes exceed deterministic estimates for the maximum earthquake acceleration: Association of Dam Safety Officials, 1994 Western Regional Conference Proceedings, p. 99-104.
- Lips, E. W. and Keaton, J. R., 1994, The operating basis earthquake for dams: making sense of the numbers game: Association of Engineering Geologists 37<sup>th</sup> Annual Meeting, Program and Abstracts, p. 54.
- Currey, D., Lips, E. W., Thein, B., Wambeam, T., and Nishazawa, S., 2001, Elevated Younger Dryas lake levels in the Great Basin, western U.S.A.: Geological Society of America, Abstracts v. 33, no. 6, p. A-217.

**EXPERT REPORT of  
ELLIOTT W. LIPS, Ph.D. A.B.D., P.G.**

**I. QUESTION PRESENTED**

Attorneys for Southern Utah Wilderness Alliance ("SUWA") asked me to review the PAP and documents related to the decision to grant UEI a permit and to identify any instances in which the data submitted by UEI, or the permit review, failed to comply with either commonly accepted industry standards or sound scientific practices and methods, as reflected in the regulations governing hydrology submissions and review for permits.<sup>1</sup> This Expert Report summarizes my findings and conclusions.

**II. BRIEF ANSWER**

Coal mines have a long history of damaging the surrounding environment by poisoning the water with acid mine drainage and toxic chemicals. In addition, mining operations have significantly affected the flow of water to seeps and springs, and altered discharge to rivers, thereby destroying aquatic ecosystems. That is why the Coal Mining Rules governing the geologic and hydrologic data that must be collected, and the assessments that must be made, are very strict and why the laws require that they be explicitly and vigorously enforced. Three important concepts in the Rules, carried throughout all the sections examined below, are expressed in requirements to first collect a great deal of pre-mining, "baseline" data, in order to characterize the existing

---

<sup>1</sup> In performing this task, I reviewed the following information in the "Administrative Record" provided by the Division of Oil, Gas and Mining ("Division"): the hydrology and geology sections of the various Technical Analyses written by Division personnel, and all data submitted by UtahAmerican Energy, Inc. ("UEI") (including UEI's original, final, and all interim submittals and data) pertaining to geology and hydrology. I also reviewed various published scientific articles, books, and reports by the U.S. Geologic Survey ("U.S.G.S."), which are listed in the references section below. I refer to the various TAs as follows: TA #1 is dated May 26, 1999; TA #2 is dated October 18, 1999; TA #3 is dated February 23, 2000; TA #4 is dated June 29, 2000; TA #5 is dated November 20, 2000; and TA #6 is dated March 9, 2001.

hydrologic resources; second, to analyze these data extensively to try to predict impacts that would occur as a result of mining; and third, to collect data during mining operations, and then to compare these data with the baseline data in order to verify earlier predictions and ensure the water resources are fully protected. If the impacts to the hydrologic resources (and the humans, plants, and animals that use the water) are too great, a mining permit cannot be issued until ways are found of reducing and controlling the risk.

Thus, the Rules are not just paperwork obligations placed on applicants to generate a large "record," to be fulfilled by simple dotting the "i"s and crossing the "t"s. Rather, they are serious, substantive requirements, and they often require significant investment of time, effort, and expense to collect all required data and fully understand the hydrologic resources, and assess probable impacts before mining operations are allowed to commence.

UEI has completely sidestepped this process, and the Division, while recognizing the paucity or absence of UEI's data and shallowness of its promised future commitment, has ultimately failed to force UEI to comply with the Rules as a condition to permit issuance. As a result of the Division's failure to follow through on enforcing compliance with its own Rules, the risk of permanent toxic contamination and/or complete elimination of critical water resources (and the biological communities dependent on these resources) as a result of this mine are immense and un-assessed.

### **III. RELEVANT EXPERIENCE**

In 1983, I received my Bachelor's degree from Western State College of Colorado with a double major in geology and physics. In 1990, I received my Master's

Degree in geology from Colorado State University. I am currently a Doctoral Candidate (Ph.D., A.B.D.) in the Department of Geography at the University of Utah.

Between 1983 and 1985, I was employed by the U.S. Geological Survey. During this time I participated in, and co-authored several studies relating to ground water movement and landslides, and surface water flooding. Most of the investigations were on sites of recent flooding and landslide activity in central Utah.

Between 1985 and 1997, I was employed as a full-time consulting engineering geologist. During this time I conducted approximately 15 investigations for ground water contamination from mines, mills, smelters, tailings ponds, and other industrial facilities in Utah, Colorado, Nevada, and California. I participated in four separate seep and spring surveys for existing and proposed mines in Utah and Nevada, ranging in size between 2 and 50 square miles. I performed hydrology and hydraulics analyses and designed runoff control plans at numerous mine and industrial facilities in Utah and Nevada. I prepared geology, hydrology, and engineering components of mining and reclamation plans for 21 open-pit and underground mines, mill and concentrator sites, smelters, and tailings impoundments.

In the past 16 years, I have assisted in the preparation of geology, hydrology, and engineering portions of mining and reclamation plans at six coal mine facilities in Utah (Knight Mine, Star Point Mine, Soldier Canyon Mine, Sunnyside Mines, Horse Canyon Mine, and the Rilda Canyon Mine). I have also supported permitting activities at five non-coal mine facilities in Utah (Mercur Mine, Kennecott {mine, mill, smelter, and tailings pond}, Carr Fork Mine, IS&R {mill site and tailings pond}, and the Goldstrike Mine). In addition to permitting activities for the Division of Oil Gas and Mining, I have prepared



permit applications for ground- and surface-water discharge in support of the NEPA and the Clean Water Act.

In the past 10 years, I have provided permitting expertise in the areas of surface and ground water quality and quantity for proposed mines, tailings ponds, dams, highways, and river diversions. These projects have involved review of NEPA documents, 404 Permit Applications, FERC Applications, and UDOGM Mining and Reclamation Plans. I have prepared reports and provided expert testimony twice in Federal Court, and in a hearing before the Utah Board of Oil Gas and Mining.

I am currently a full-time Adjunct Associate Professor in the Department of Geography at the University of Utah. I teach classes in Earth surface processes (including surface and ground water systems), environmental studies, and resource conservation and environmental management. My curriculum vitae is attached at Tab 1.

#### IV. FINDINGS

##### A. DATA SUBMITTED BY UEI IS INSUFFICIENT TO ESTABLISH A BASELINE FROM WHICH A RATIONAL ASSESSMENT OF HYDROLOGIC IMPACT OF MINING ACTIVITY COULD BE MADE

##### 1. Acid- or Toxic-Forming Material.

*The requirement* – Mining is well known to pose a risk of introducing toxic and/or acid forming minerals into surrounding waters. These pollutants alter the water chemistry to the detriment of aquatic plant and animal communities. As a result, the coal mining rules establish the minimum data that must be collected by an applicant to establish a pre-mining (baseline) description of the potential for acid- or toxic-forming materials. The entire concept of the Rules is to first analyze pre-mining, baseline data to assess and minimize future impacts and then later to compare pre-mining baseline with

operational monitoring results. The requirements for baseline data are, therefore, critical to the entire regulatory process and the essential piece of information upon which all other scientific analyses and comparisons must be based.

Among other things, the rules require the applicant to collect samples from test borings or drill holes and analyze for acid- or toxic-forming materials:

*Rule 624.300. For lands within the permit and adjacent areas of UNDERGROUND COAL MINING AND RECLAMATION ACTIVITIES where the strata above the coal seam to be mined will not be removed, samples will be collected and analyzed from test borings or drill cores to provide the following data:*

*624.320. Chemical analyses for acid- or toxic-forming or alkalinity-producing materials and their content in the strata immediately above and below the coal seam to be mined;*

***Deficiencies in UEI's submittals*** - UEI did not collect any samples and analyze them as required. Rather, UEI relied on unsupported, anecdotal evidence from the Sunnyside mine 8 miles away:

*"With over 100 years of mining experience at the Sunnyside mine operation, there has been no proven problem with acid-forming alkaline or toxic materials in production or waste disposal. The above statement is made based on history, data substantiating this assertion is beyond the scope of this MRP and is not included."*

(PAP 6-39, Bates 5195, Tab 2) (emphasis added). Thus, UEI admits that it neither collected nor supplied any of the required data. Moreover, acid- and toxic-forming materials are expressly required to be discussed, but are not (PAP 6-37, Bates 5193, Tab 3).

***The Division concluded UEI's submittal was therefore deficient*** - Six times the Division concluded, and informed UEI, that the permit application lacked the required data, was therefore deficient, and could not be approved (TA # 1, Bates 2504; TA # 2,

Bates 2309-2310; TA # 3, Bates 1784; TA # 4, Bates 1655-1656; TA # 5, Bates 1531; TA # 6, Bates 470, 472, Tabs 4-9). *No data* were submitted in response to any of these requests.

In its Sixth Technical Analysis, the Division concluded that:

Current information is not sufficient to assist in determining all potentially acid- or toxic-forming strata down to and including the stratum immediately below the coal seam to be mined and determining whether reclamation can be accomplished, but excavated or mined material will be examined and tested as necessary to determine acid- and toxic-forming potential.

It has not been established that the underground development waste that will come from construction of the tunnels can be properly disposed of at a refuse pile and that reclamation of a refuse pile can be accomplished.

(TA # 6, Bates 470, 534, Tab 10). Although *no additional data* on this point were submitted by UEI between the Sixth and Final Technical Analyses, the conclusion that "current information is not sufficient" was inexplicably dropped from the Final Technical Analysis and the permit application was approved.

*Scientific necessity for obtaining Lila Canyon baseline data as required* - In my opinion, UEI's asserted correlation to Sunnyside as a basis for avoiding data collection in Lila Canyon is unjustified. Facies changes and consequent lithology changes can occur over short vertical and horizontal distances, and the distance between the Sunnyside Mine and Lila Canyon is 8 miles. The formations of the Book Cliffs, by the nature of their depositional environments, exhibit numerous and rapid facies and lithologic changes.<sup>2</sup> This is particularly true of the Blackhawk Formation, where individual members were deposited in an oscillating regressive seaway (CHIA pg. 3, Bates 804, Tab 13). The

---

<sup>2</sup> The PAP itself demonstrates that there are rapid changes in the lithologies within the permit area. For example, pages 6-22 and 6-24 of the PAP (Bates 5178, 5180, Tab 11) state that the Sunnyside main seam extends over the entire property and varies in thickness from 45 inches to more than 18 feet. In addition, the CHIA on page 15 (Bates 6430, Tab 12) discusses major facies and formation changes in the Book Cliffs coal fields.

presence of acid- and toxic-forming materials depends to some extent on pyrite content, which can vary widely with small changes in depositional environment.<sup>3</sup> Thus, without site-specific data, the unique properties (such as toxic- and acid-forming properties) of strata in areas separated by miles cannot be assumed to be similar.

Even if the lithologies could be assumed to be exactly identical (and the rules requires "test borings or drill holes", not assumptions), UEI's conclusion about the Lila Canyon area acid-forming potential is unsupported by any data and is actually *contradicted* by the data known to the Division. The Division stated in its final Technical Analysis:

The Division is aware of an instance where acid water formed at the Sunnyside slurry pond, but it did not cause problems or offsite impacts.

(Final TA, pg. 32, Bates 647, Tab 14). Thus, the Division acknowledges that, even based on its own knowledge (for no data was supplied by UEI), acid- or toxic-forming materials *were* present at the Sunnyside mine.

UEI plans to tunnel through and remove geologic materials below the Sunnyside coal seam in order to develop the mine. This is the underground development waste discussed above. The geologic log for IPA-1 (Bates 5201, 5211, Tab 15) indicates that these materials contain pyrite. Thus, the Division's concern about the acid- or toxic-forming potential (repeated to UEI 6 times in 6 Technical Analyses), and the ability to reclaim these materials, is entirely justified.

---

3 The Blackhawk Formation consists of interbedded sandstone, mudstone, siltstone, shale, and coal deposited in a broad coastal plain. Within this coastal zone were barrier beaches, deltas, tidal lagoons and swamps. During the late Cretaceous, this area was inundated numerous times by transgressing and regressing seaways. With each transgression and regression the location of each depositional environment shifted landward or seaward, ultimately producing the thick sequence of interbedded and interdigitating sedimentary rocks (Hintze, 1988). Sulfur content has been shown to vary not only with depositional environment, but also to vary depending on whether the sea is transgressing or regressing (Galloway and Hobday, 1983).

**Conclusion** - In my opinion, UEI has not collected or submitted the baseline data (test borings and samples) required by sound scientific practice and this Rule. Moreover, the purpose of this Rule is to require that applicants provide information *before* mining begins on potential acid- and toxic-forming materials that might cause problems for mining or prevent successful reclamation. Sampling *during* mining operations will not achieve these goals.

**Impacts** - UEI's failure to collect and analyze acid- and toxic-forming materials, and the Division's failure to require these data, make it impossible to evaluate potential impacts to the environment and assess reclamation potential. Acid waters may result from disposing of these materials in the waste pile, and this pile may not be reclaimable.

2. **Subsurface water resource maps showing seasonal difference in head.**

**The requirement** - One of the major issues in assessing whether to grant or deny a coal mining permit is determining what effect the subsurface mining activity will have on existing ground water resources. Accordingly, the coal mining Rules are very clear in requiring the applicant to submit cross sections and contour maps showing seasonal differences of head in the aquifers. Rule 722 provides:

*722. Cross Sections and Maps. The application will include cross sections and maps showing:*

*722.100. Location and extent of subsurface water, if encountered, within the proposed permit or adjacent areas. For UNDERGROUND COAL MINING AND RECLAMATION ACTIVITIES, location and extent will include, but not limited to areal and vertical distribution of aquifers, and portrayal of seasonal differences of head in different aquifers on cross-sections and contour maps.*

The purpose of these maps is to show how the aquifer fluctuates seasonally. This is an essential piece of information in identifying the ground water resource, and is necessary



in order to characterize the seasonal variations that occur within the aquifers. Without it, future impacts can neither be predicted now nor identified when they occur.

***Deficiencies in UEI's submittal*** - These maps and cross sections have never been included in the PAP. The PAP is therefore plainly deficient.

***The Division concluded UEI's submission was deficient*** - The Division has concluded, and has advised UEI repeatedly, that this information was necessary to the permit application before a permit could be approved (Tab 60).<sup>4</sup> While the Division asked UEI 6 times to provide these maps *as a condition to permitting*, the information was never submitted.

***Conclusion*** - In my opinion, UEI has not submitted any maps and cross sections "portraying seasonal differences of head in aquifers" as required by the Coal Mining Rules, and the thus, the Permit should not have been approved.

***Impacts*** - Without providing the cross sections and maps, UEI has failed to characterize the existing water resources, and thus it will be impossible to assess any impacts that occur as a result of the mining operation. The ground water resources could be irreparably impacted. Mining could remove water from aquifers causing seasonal flow to seeps and springs to be disrupted and base flow to streams to be diminished or eliminated. Without baseline data on seasonal differences in the aquifers, the Division would have no means of assessing these impacts.

---

<sup>4</sup> The first TA states "There is no portrayal of seasonal differences of head on cross sections and contour maps" (Bates 2509). This deficiency was repeated in the Second TA (Bates 2313), Third TA (Bates 1800), Fourth TA (Bates 1673), Fifth TA (Bates 1549), and Sixth TA (Bates 489-490)(all at Tab 16).

**B. THE WATER MONITORING PLAN IS SCIENTIFICALLY FLAWED**

3. **UEI's surface water monitoring plan can not be carried out because there is no baseline data for comparison.**

*The requirement* –As stated above, the known risks of mining include its potentially devastating effects on existing ground water and surface water resources. Under the Coal Mining Rules, surface-water monitoring is to be conducted during the mining operation in order to “determine the impacts of the operation upon the hydrologic balance”;

*Rule 731.220. Surface-Water Monitoring. Surface-water monitoring will be conducted according to the plan approved under R645-301-731.220 and the following:*

*731.221. The permit application will include a surface-water monitoring plan based upon the PHC determination required under R645-301-728 and the analysis of all baseline hydrologic, geologic and other information in the permit application. The plan will provide for the monitoring of parameters that relate to the suitability of the surface water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance as set forth in R645-301-731 as well as the effluent limitations found in R645-301-751;*

*731.222. The plan will identify the surface water quantity and quality parameters to be monitored, sampling frequency and site locations. It will describe how these data may be used to determine the impacts of the operation upon the hydrologic balance.*

“Hydrologic Balance” means the relationship between the quality and quantity of water inflow to, water outflow from and water storage in a drainage basin or aquifer and encompasses changes in ground and surface water storage (Rule 645.100.200). In order to determine whether or not there have been “impacts” (i.e., changes), one must *compare* the monitoring data to data collected prior to the mining operations, and one *must have* baseline data at the proposed monitoring points in order to make this comparison. The Division's Directive Tech-004 (Tab 17) explains the purpose of baseline and operational

monitoring and how they are used to assess mining related impacts to the hydrologic balance: "Water monitoring requirements are established to identify and assess the hydrologic conditions prior to, during and after mining to ensure protection of the hydrologic balance, and to detect changes to the hydrologic regime caused by mining activities".

***Deficiencies in UEI's submittal*** - No baseline hydrologic data have been collected or submitted by UEI for Lila Canyon or Little Park Wash, two intermittent streams within the permit area. These baseline data are not optional, as the Rule states "*a surface-water monitoring plan based upon the PHC determination required under R645-301-728 and the analysis of all baseline hydrologic, geologic and other information in the permit application*" (emphasis added). Rule 724.200 requires submission of baseline information on seasonal flow rates and seasonal variations in water quality and quantity.

***The Division concluded UEI's submission was deficient*** - The Division repeatedly advised UEI that it had failed to collect and submit the required surface water baseline data for the proposed monitoring sites in Lila Canyon (TA # 4, Bates 1669, 1670; TA # 5, Bates 1546; TA # 6 Bates 448, 481)(all at Tab 18). The final TA flatly states, "There are no historic baseline data, not even reports stating no-flow, for L-1-S, L-2-S, and L-3-S in Lila Canyon, nor for surface water anywhere in the Lila Canyon drainage" (Pg. 44, Bates 659, Tab19). The Division fails to state why the permit should nonetheless be granted.

***The data could have been collected*** - UEI and the Division both acknowledge that Lila Canyon and Little Park Wash flow in response to snowmelt runoff during the

spring and also as a result of isolated summer thunderstorms (PAP 7-13, Bates 5347, Tab 20; see also CHIA page 27, Bates 6442, Tab 21). If the Division required UEI to submit data under this Rule, both baseline water quantity and water quality data can be obtained in one of two ways: (1) by observing and sampling during and after precipitation or snowmelt events,<sup>5</sup> or (2) by installing data collection devices that can function without personnel being present during the runoff event. Given that UEI has personnel within an hour drive of the proposed mine site, it is an insignificant task to collect a sample during a runoff event. In addition, remote methods for collecting both water quality samples and flow depth are well within the state of the art, are standard practice by the U.S. Geological Survey (U.S.G.S., 1977), and have been used at other coal mine sites.

**Conclusion** - UEI could have easily collected the required baseline data, but did not. Without this baseline data, the monitoring plan is scientifically flawed, as the required pre-mining and mining comparison cannot be made.

**Impacts** - It will be impossible to detect and evaluate impacts related to the mining operations without having the necessary and required baseline data for comparison, and these data do not exist. This creates the risk that impacts will occur to the hydrologic balance, but that the Division will have no means of assessing them.

4. **The ground water monitoring plan fails to include water quality monitoring of the regional aquifer.**

**The requirement** - Water quality can be impacted by altering the pH, conductivity, temperature, or concentrations of naturally occurring chemical constituents. Table 4 of Tech-004 (Tab 17) lists 35 parameters that the Division uses to characterize

---

<sup>5</sup> UEI apparently made three attempts to collect baseline data, each time reporting "no flow". From the dates of these efforts, they were not after snow melt, and from the fact that no flow was recorded, they apparently were not during or after precipitation events. Thus, it is not surprising these attempts yielded no data.

ground water quality. Changes in any of these 35 parameters will alter the water quality. It is clear by the number of parameters that water quality can be impacted in a variety of ways. Because of the great risk of ground-water contamination from mining activities, the Coal Mining Rules require the applicant to monitor ground-water quality from aquifers to assess potential toxic or harmful mining impacts:

*Rule 731.211. The permit application will include a ground-water monitoring plan based upon the PHC determination required under R645-301-728 and the analysis of all baseline hydrologic, geologic and other information in the permit application. The plan will provide for the monitoring of parameters that relate to the suitability of the ground water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance set forth in R645-301-731. It will identify the quantity and quality parameters to be monitored, sampling frequency and site locations. It will describe how these data may be used to determine the impacts of the operation upon the hydrologic balance. At a minimum, total dissolved solids or specific conductance corrected to 25 degrees C, pH, total iron, total manganese and water levels will be monitored.*

As noted above, monitoring is critical to identifying and minimizing impacts to ground-water resources.

**Deficiencies in UEI's submittal** - UEI states "groundwater is present in consolidated bedrock, in both a regional aquifer and isolated perched aquifers" (PAP 7-6, Bates 5340, Tab 22). It is clear that there are at least two distinct aquifers within the proposed permit area; one that UEI refers to as the "regional aquifer" and one or more that it refers to as the "perched aquifers". The Division concurs with this delineation of distinct aquifers (CHLA pgs. 45, 46, Bates 6460-61, Tab 23).

UEI proposes to monitor ground water from the regional aquifer from boreholes IPA-1, IPA-2, and IPA-3, but they will be checked for water depth only, not water quality (PAP 7-32, Bates 5365, Tab 24). The only water *quality* monitoring proposed will be from seeps and springs. As pointed out in the CHLA, however, only Redden Spring



receives recharge from the deep ground water storage (the regional aquifer) (pg. 45, Bates 6460, Tab 23); the other springs do not. According to the PAP, there is no monitoring of either quantity or quality proposed for Redden Spring (PAP 7-36, Bates 5369, Tab 25). Thus, the ground water monitoring plan is totally devoid of any water quality monitoring in the regional aquifer.

*No basis for waiver exists* - According to Rule 731.213, the Division may waive monitoring of a particular stratum "If an applicant can demonstrate by the use of the PHC determination and other available information that a particular water-bearing stratum in the proposed permit and adjacent areas is not one which serves as an aquifer which significantly ensures the hydrologic balance within the cumulative impact area". First, the PHC fails to demonstrate this. Second, even though "hydrologic balance" includes water quality (Rule 645-100-200), the CHLA, in discussing the probable future impacts of mining activity on the ground water, never addresses water quality (pgs. 45-47, Bates 6460-6462, Tab 23). Third, the Division has not determined that monitoring of this aquifer should be waived, as evidenced by the fact that it is requiring UEI to monitor its water level during mining operations.

*Conclusion* - In my opinion, there is no scientific justification under Rule 731.213 for not monitoring the water quality of the regional aquifer in the proposed mine area, and therefore the water-monitoring plan fails to meet the requirements of Rule 731.211.

*Impacts* - Water quality monitoring is essential in order to assess impacts related to mining operations. Without this monitoring, the water quality in the regional aquifer could be irreparably harmed, and neither UEI nor the Division would be aware of it.

Given the numerous ways in which mining operations can impact any of the 35 water quality parameters, monitoring of the regional aquifer is absolutely essential.

5. **The ground water monitoring plan cannot be carried out because there is insufficient baseline data for comparison.**

*The requirement* - Ground-water monitoring is intended to "determine the impacts of the operation upon the hydrologic balance":

*Rule 731.211. The permit application will include a ground-water monitoring plan based upon the PHC determination required under R645-301-728 and the analysis of all baseline hydrologic, geologic and other information in the permit application. The plan will provide for the monitoring of parameters that relate to the suitability of the ground water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance set forth in R645-301-731. It will identify the quantity and quality parameters to be monitored, sampling frequency and site locations. It will describe how these data may be used to determine the impacts of the operation upon the hydrologic balance. At a minimum, total dissolved solids or specific conductance corrected to 25 degrees C, pH, total iron, total manganese and water levels will be monitored.*

In order to determine whether or not there have been impacts one compares the monitoring data to pre-mining baseline data. Obviously, one must have baseline data at the proposed monitoring points in order to make this critical comparison.

***Deficiencies in UEI's submittal*** - UEI proposes to monitor ground water from the perched aquifers at 5 springs (L-6-G, L-7-G, L-8-G, L-9-G, and L-10-G) (PAP 7-31, 39, and 40, Bates 5364, 5372-73, Tab 26). However, insufficient baseline data have been collected and submitted by UEI for these proposed monitoring sites. These baseline data are not optional, as the Rule states "a ground-water monitoring plan based upon the PHC determination required under R645-301-728 and the analysis of all baseline hydrologic, geologic and other information in the permit application" (emphasis added).

Rule 724.100 requires submission of baseline information on seasonal quality and quantity of ground water.

*The Division concluded UEI's submission was deficient* - Six times the Division informed UEI that the baseline data for these proposed monitoring sites was insufficient. These were listed in outstanding deficiencies of previous TA's, and the Division stated that the permit *could not be approved* without this information<sup>6</sup> (Tab 60). Because no data had been collected since 1995, the Division insisted that UEI immediately resume monitoring of these sites to assure that they are still flowing and usable for monitoring, and to establish a current baseline that will be continuous with operational monitoring. With the exception of one sample from one spring, UEI provided none of the data that the Division stated that it needed in order to approve the permit.<sup>7</sup> In fact, UEI acknowledges

---

<sup>6</sup> See Tab 27. In the First TA, the Division informed UEI that "Baseline data collected at the proposed operational spring-monitoring sites are not sufficient to demonstrate seasonal quality and quantity" (Bates 2507-2508). In addition, the Division pointed out that there were no data more recent than 1995 for these proposed monitoring sites in their list of outstanding deficiencies (TA # 2, Bates 2311). These deficiencies were repeated in TA # 3 (Bates 1761-1762). In TA # 4, the Division once again pointed out that there had been no data collected from the proposed monitoring sites since 1995, and instructed UEI to resume monitoring of these sites "immediately to assure that they are still flowing and usable for monitoring, and to establish a current baseline that will be continuous with operational monitoring" (Bates 1669-1670). In TA # 5, the Division acknowledged that a monitoring program was implemented, but that the Division had not received any data (Bates 1510). Also in TA # 5, the Division states "Baseline data are missing or insufficient for most proposed surface- and ground-water monitoring points. The permit *cannot be approved* until the necessary hydrologic and geologic information is available" (Bates 1543)(emphasis added). TA # 6 points out three times that *no new data* have been received and that the baseline data are insufficient for proposed ground-water monitoring points (Bates 448, 475, and 482). No new data were received before issuance of the Final TA, which simply states that monitoring of springs continues (Bates 652). (All at Tab 27)

<sup>7</sup> See Tab 28. At L-6-G, there was apparently flow on 7/24/2000, but it was not sampled; twice UEI did not access this spring, and two times there was no flow (Bates 5558). Thus, none of the required additional data was provided. At L-7-G, twice there was flow, but UEI did not collect a sample; twice UEI did not access the spring; only once did they collect a sample, but the laboratory results are not included, thus, no new data exist (Bates 5559). At L-8-G, once there was flow, but UEI did not collect a sample, twice UEI did not access the spring, once they collected a sample and received analytical results, and once they collected a sample but did not include the analytical results (Bates 5560). At L-9-G, twice there was flow, but UEI did not collect a sample; twice UEI did not access the spring, only once did they collect a sample, but the laboratory results are not included, thus, no new data exist (Bates 5561). At L-10-G, twice there was flow, but UEI did not collect a sample; twice UEI did not access the spring, only once did they

that no new data has been gathered on these sites since 1995 (PAP 7-32, Bates 5365, Tab 24).

**Conclusion** - In my opinion, the Division cannot justify approving this permit without receiving the baseline data that it insisted (six times) was required. Without these data, it is scientifically and logically impossible to prepare the required *analysis* of baseline data or later to determine the *impacts* to the water resource. Thus, the water monitoring plan is scientifically meaningless and fails to meet the requirements of the Coal Mining Rules.

**Impacts** - Without the required baseline data, it will be impossible to determine if there are impacts to the ground-water resources as a result of mining operations. Because the "baseline" data are insufficient to determine pre-mining seasonal water quality or water quantity, impacts to either of these would be undetected by the Division. Water quality could be degraded to the point of detrimental impacts to plant and animal communities, seeps and springs could dry up entirely destroying the ecosystems that they support.

### C. FAILURE TO CHARACTERIZE THE REGIONAL AQUIFER

The Coal Mining Rules require the applicant to submit the following information about ground water:

*Rule 724.100. Ground Water Information. The location and ownership for the permit and adjacent areas of existing wells, springs and other ground-water resources, seasonal quality and quantity of ground water, and usage. Water quality descriptions will include, at a minimum, total dissolved solids or specific conductance corrected to 25 degrees C, pH, total iron and total manganese. Ground-water quantity descriptions will include, at a minimum, approximate rates of discharge or usage and depth*

---

collect a sample, but the laboratory results are not included, thus, no new data exist (Bates 5562). (All at Tab 28)

*to the water in the coal seam, and each water-bearing stratum above and potentially impacted stratum below the coal seam.*

As discussed above in Section 4, UEI states, and the Division concurs, that groundwater is present in consolidated bedrock, in both a regional aquifer and isolated perched aquifers. While the Rules do not state that the applicant and the Division must "understand" the regional aquifer, that is exactly what is required under this rule and the other rules requiring the Division to assess future impacts to the groundwater resource.

6. **There is insufficient water quantity baseline data from IPA-1, IPA-2, and IPA-3.**

*The requirement* – Rule 724.100 requires information on seasonal quantity of ground water. Seasonal data are required to quantify how water in the aquifers varies in response to seasonal inputs of precipitation. Because water inflow varies seasonally, so does water outflow, and these variations have significant impacts to the biological communities reliant on ground water discharge from aquifers. Thus, in order to characterize water in an aquifer, seasonal data are of utmost importance, and having infrequent, sporadic, and unsystematic measurements fails to meet accepted scientific standards. Furthermore, the Division has interpreted Rule 724.100 and these scientific standards as requiring the applicant to submit the following information:

Baseline information shall be collected quarterly for a minimum of two years prior to permit issuance. Data should be sufficient to demonstrate seasonal variation in quality and quantity for each source.

(Directive No. Tech-004, page 9 (Tab 17)).<sup>8</sup>

***Deficiencies in UEI's submittal*** - UEI has failed to provide data on the seasonal quantity of ground water from IPA-1, IPA-2, and IPA-3, as required by rule 724.100 and

---

8 This Directive was cited to UEI and relied upon by the Division as establishing the scientific requirements for submission of permit data, and I agree that this is the minimum data necessary to establish baseline hydrologic conditions.

Tech-004. These wells were sampled twice in 1994 (7 days apart), twice in 1995, once in 1996, and once in 2001 (IPA-2 was additionally sampled once in 2000) (PAP Appendix 7-1, Bates 5551, Tab 29). Clearly this infrequent and sporadic sampling does not provide seasonal data, as required by Rule 724.100, nor is it quarterly for a minimum of two years prior to permit issuance, as required by Tech-004.

*The Division's Review* – Pursuant to Rule 724.100 and Tech-004, the Division told UEI that its permit application was deficient because it lacked that data. "There are seasonal water-level measurements in the PAP for IPA-1, IPA-2, and IPA-3 for 1994, 1995, and 1996 but no baseline for 1997 or 1998" (TA # 1, Bates 2566, Tab 30). In the second TA, this deficiency was repeated and 1999 was added to the list of years for which baseline data was lacking (Bates 2310, Tab 5). By adding 1999, it is very clear that the Division is requiring *current* baseline data pursuant to Tech-004, and has acknowledged that there are no baseline data compliant with Rule 724.100 and its Directive.

The Division again stressed the lack of required baseline data in TA # 3 (Bates 1788) and in TA # 4 by stating "monitoring of these wells should resume immediately both to assure that they are usable and to establish a current baseline that will be continuous with operational monitoring" (Bates 1635) (both at Tab 31).

At the Division's urging, UEI apparently attempted to monitor these three sites 3 times but was "unable" to collect data for various reasons. The results of this baseline water-monitoring program are presented in Appendix 7-1 of the PAP (Bates 5551, Tab 29). On 12/22/00, no water level information was obtained from two of the wells because UEI was unable to reach the bottom. On 2/07/01, none of the wells were



accessible and no water level was obtained. Only on 5/15/01 were water levels read in all three wells.

**Conclusion** – UEI's efforts simply did not yield current baseline information that will be continuous with operational monitoring. These data do not cover the required two-year period and are not sufficient to show seasonal variation in water quantity. Scientifically, one measurement cannot constitute the required "current baseline." Thus, by Rule 724.100, the Division's own directives, and as measured against any scientific standard, the data are wholly inadequate.

**Impacts** - UEI has failed to characterize the existing water levels in these three wells and thus has no basis for comparison to water levels measured during mining. It will therefore be impossible to assess any impacts to this water resource related to the mining operations.

7. **UEI failed to incorporate groundwater level data from the Horse Canyon Mine.**

**The requirement** - The groundwater elevation in the Horse Canyon Mine at the rotary car dump was approximately 5,800 feet in 1986 and has probably remained at this level since operations ceased in the Horse Canyon Mine in 1983. (PAP 7-12, Bates 5346, Tab 32). Having a known water level elevation provides an additional data point that should have been used in constructing the map of the piezometric surface of the regional aquifer, as required in Rule 722.100.

**The Division concluded UEI's submission was deficient** - The Division directed UEI to include this data point on Plate 7-1 (TA # 1, Bates 2509-10, Tab 33). The Division repeated this deficiency in TA # 2 (Bates 2312, Tab 33).

**UEI's Response** - In subsequent Technical Analyses, the Division states that this point appears to have been used in projecting the piezometric surface mapped on Plate 7-1 (TA # 3, Bates 1800; TA # 4, Bates 1673; TA # 5, Bates 1549; TA # 6, Bates 490; and the Final TA, pgs. 51-52, Bates 666-667)(all at Tab 34). This is nonsense, as even a cursory examination of Plate 7-1 (Bates 5659, Tab 35) shows that this point would project at an elevation of 5880 and not 5800 according to the piezometric surface drawn.

**Conclusion** - There is a fundamental difference between simply putting a point on a map, and using that data point in the interpretation of the piezometric surface. Had UEI *used* the data point, the piezometric contours would have been redrawn to reflect its elevation. UEI has failed to incorporate the data from this known water elevation in the preparation of Plate 7-1. Thus, their description and characterization of the piezometric surface cannot be correct because they selectively ignored a critical data point.

**Impacts** - Without having an accurate characterization of the existing piezometric surface (one that includes all data sources), it will be impossible to determine changes to the water levels in the regional aquifer related to mining operations.

8. **There are no site-specific data on hydraulic conductivities.**

**The requirement** - UEI has provided no information on the aquifer properties within the mine area that are necessary to describe the rates of discharge of ground water under Rule 724.100. Without this information, impacts to the aquifer cannot be assessed. Quantifying site-specific rates of discharge is critical to understanding the rate and amount of ground water movement in an aquifer and, thus, assessing quantities of water discharging from the aquifer. Because ground water discharges to seeps, springs, and

streams, it is critical to quantify and understand aquifer properties in order to assess impacts that could occur to these water resources.

*The Division acknowledges that no data exist* - UEI has no data for the area to be mined, so it is relying on regional data (CHIA pg.16, Bates 6431, Tab 36). An examination of the data reported in the literature for the Blackhawk Formation, indicate that hydraulic conductivities range from  $10^{-11}$  cm/sec to  $10^2$  cm/sec (CHIA Table 1, Bates 6432, Tab 37). This range of hydraulic conductivities is to be expected, given the numerous and rapid facies changes resulting in varying lithologies. Given this range, there is absolutely no basis for the statement in the CHIA that "low hydraulic conductivities can be expected in the strata to restrict ground-water movement" (CHIA pg. 16, Bates 6431, Tab 36), and thus, no reasonable conclusion can be drawn about the hydraulic conductivities that can be expected at the proposed mine site.

**Conclusion** - The Division's expectation is totally without basis and merely illustrates the need for site-specific information, which UEI has failed to provide.

**Impacts** - Without site-specific data, the rate of discharge in the regional aquifer are unknown, the quantity of water that could be impacted during the mining operation is unknown, and thus the potential impacts to seeps, springs, and streams is unknown.

9. **UEI and the Division failed to address the effect of the faults on the regional aquifer.**

**The requirement** - The Coal Mining Rules require the applicant to show how the regional and structural geology may affect the occurrence, availability, movement, and quantity of potentially impacted ground water:

*Rule 624.100. A description of the geology of the proposed permit and adjacent areas down to and including the deeper of either the stratum immediately below the lowest coal seam to be mined or any aquifer below the lowest coal seam to be mined which may be adversely impacted by mining. This description will include*

*the regional and structural geology of the permit and adjacent areas, and other parameters which influence the required reclamation and it will also show how the regional and structural geology may affect the occurrence, availability, movement, quantity and quality of potentially impacted surface and ground water.*

Faults are structural geologic features that often drastically affect the occurrence and movement of ground water. There are several east-west trending faults that bisect the mine permit area and CIA, and are well documented in the PAP (6-26 thru 6-34, Bates 5182-5190 and Plate 6-1, Bates 5326)(Tab 38); and Plate 7-1 Bates 5659, Tab 35). These faults affect the occurrence and movement of ground water in both the perched aquifers and the regional aquifer. Water is known to accumulate in these faults, potentially in substantial quantities (Bates 5184, 5341, 5197, Tab 39). The faults exert a dominant control on the flow direction and magnitude of ground water (PAP 7-7, Bates 5341, Tab 39).

***Significance of the faults*** - The local significance of the faults on the regional aquifer is noted from the water level data in IPA-1, IPA-2, and IPA-3 (PAP Appendix 7-1, Bates 5551, Tab 29). These data indicate that the water level in IPA-1 has risen 19.6 feet between 7/28/94 and 5/15/01. During this same period, water levels in IPA-2 and IPA-3 only fluctuated a minor amount (4.3 foot rise in IPA-2, 1.4 foot drop in IPA-3). In the final TA (pg.37, Bates 652, Tab 27) the Division notes that IPA-1 is separated from IPA-2 and IPA-3 by a fault. Thus, faulting clearly affects the occurrence of water in the regional aquifer and thus, UEI must adequately characterize them according to Rule 624.100.

***The Record is flawed and inconsistent*** - Page 37 of the final TA (Bates 652, Tab 27) states "The water level at IPA-1 was roughly 14 feet *lower* than the last

measurement in 1996; however, water levels in IPA-1 were decreasing during the 1996 to 1998 monitoring period. The reason for this decline is unknown" (emphasis added). There are several problems with this statement. First, as clearly indicated by the data in Appendix 7-1, the water levels rose from 1996 to 2001, not declined. Second, this statement refers to "the 1996 to 1998 monitoring period" yet no data are presented in the PAP for this period and no explanation for the data's omission is given. The fact that there is inconsistent and missing information in the PAP indicates that UEI and the Division do not understand the occurrence of water in the regional aquifer, or the relation of the faults to the occurrence and movement of this water.

**Conclusion** - This lack of understanding makes it impossible to make any accurate determination of the PHC and to conduct a meaningful CHIA. There is not one single mention of the east-west trending faults in the PHC (Appendix 7-3, Bates 5648-5658, Tab 40). The failure to assess their well-documented presence and effect on occurrence and movement of ground water is a serious omission from the PHC. The CHIA (pgs. 22-23, Bates 6437-6438, Tab 41) states that the water level in IPA-1 has risen over the years (complete contradiction to statements made in the TA). They again state that the change in the water level is not completely understood, but that a fault separates this well from the other two. The displacement of this fault on the eastern end is unknown. Thus, the Division does not adequately assess the importance of these faults in the CHIA. There is contradictory information and interpretations regarding the water levels and no information on the extent of the fault. Since it fails to address this key structural feature of the area, the CHIA fails to assess the material damage that will occur

in the hydrologic balance of the regional aquifer as a result of mining activities intercepting the east-west trending faults.<sup>9</sup>

**Impacts** - The occurrence, movement, and quantity of water in aquifers within the proposed permit and adjacent areas is affected by faults. However, UEI and the Division fail to assess their importance, or include their influence on ground water resources in attempting to characterize the pre-mining conditions. Thus, the description of the existing hydrologic balance is scientifically flawed, and it will be impossible to assess any impacts (dewatering of seeps, springs, or streams) that occur as a result of mining operations.

10. **The depiction of the piezometric surface is erroneous.**

**The requirement** - Rule 722.100 requires that the applicant provide contour maps showing the vertical distribution of aquifers.

**Deficiencies in UEI's submittal** - UEI depicts the piezometric surface on Plate 7-1 (Bates 5659, Tab 35) as a planar, uniformly dipping surface over part of the mine permit area. There are several serious problems with this depiction. First, the piezometric surface is only shown for the Lila Canyon area, and not the Horse Canyon

---

<sup>9</sup> Not only do the east-west trending faults affect the occurrence and movement of water in the regional aquifer, they affect the occurrence of ground water in the perched aquifers. Plate 7-1 (Bates 5659, Tab 35) shows five seeps and springs aligned directly along the Central Graben Fault. In spite of this obvious association, the CHIA (pg. 18, Bates 6433, Tab 42) states "Except for L-10-G, the springs on and adjacent to the proposed permit area appear to be associated with the lower unit of the Colton Formation, and not related to any of the fault systems on the permit area." This conclusion is clearly a misrepresentation of the data presented on Plate 7-1. Neither the PHC nor the CHIA takes a hard look at the relation of the faults to seeps and springs and fail to assess the potential impact that mining will have on these resources. Furthermore, none of the five springs along the Central Graben Fault are proposed for monitoring.

In addition to the east west trending faults, the Sunnyside Fault Zone (a major north-northwest striking feature throughout much of the Sunnyside Mining District) extends to the Horse Canyon Mine and, although uncertain, it is believed to continue to the east of the Lila Canyon mine (CHIA pg. 12, Bates 813, Tab 42). This statement is in complete contradiction to Plate 6-1 (Bates 5326, Tab 38) which shows the Sunnyside fault projecting directly on to the permit boundary. It has been documented that water flowed from this fault when it was encountered in the Horse Canyon Mine (PAP 6-11, Bates 5167, Tab 42). The PAP, PHC, TA and CHIA fail to identify the location of the Sunnyside Fault Zone within the permit and adjacent areas and assess its potential impact on ground water movement in the regional aquifer.



area. Since UEI relied so heavily on Horse Canyon "data", there can be no valid scientific reason for failing to identify and show the piezometric surface on maps and cross-sections in the Horse Canyon area as well, to help determine if it is consistent with, or contradicts, UEI's "guess" at the piezometric surface for Lila Canyon area. Second, the piezometric surface shown in Plate 7-1 was drawn only on the basis of the water level data in IPA-1, IPA-2, and IPA-3. The area covered by these wells is approximately one square mile, yet UEI extrapolated the water levels out and drew in a piezometric surface covering approximately six square miles of the proposed mine area. This extrapolation of data beyond the area covered by the wells is completely without basis and is scientifically unjustified. Third, in drawing the piezometric surface, UEI selectively ignored potential data from the rotary dump in the Horse Canyon Mine. Fourth, the piezometric surface shown on Plate 7-1 ignores the effect of the faults on the occurrence of ground water. Fifth, the water surface elevations shown on Plate 1 for IPA-1, IPA-2, and IPA-3 are inconsistent with the most recent levels shown in the Appendix 7-1 of the PAP (Bates 5551, Tab 29). Sixth, because of the lack of site-specific data on the regional aquifer in the proposed mine area, UEI and the Division rely on reports from other mines in the Book Cliffs. However, in describing the regional aquifer from the Solder Canyon Mine, the CHLA states "the true potentiometric surface is almost certainly not planar with a uniform dip" (pg. 16, Bates 6431, Tab 36). Yet this is exactly how UEI portrays the piezometric surface for the Lila Canyon permit area on Plate 7-1.

**Conclusion** – Because of these scientific inadequacies and inconsistencies, the piezometric surface shown on Plate 7-1 in no way reflects the true vertical distribution of water in the regional aquifer. It does not cover the entire permit area, it does not include

all available data points, it ignores the effects of faults, and it is based on old data. Furthermore, in preparation of the piezometric surface, UEI violated a basic tenant of science by extrapolating interpretations beyond the range of the data. UEI's portrayal of the piezometric surface as a uniformly dipping, planar surface is completely at odds with descriptions of the regional aquifer in similar geologic settings.

**Impacts** - By failing to prepare an accurate map showing the vertical distribution of water in the regional aquifer, there will be no basis for comparison to the conditions during mining. Thus, it will be impossible to assess impacts related to the mining operation.

**11. UEI has failed to submit required ground water quality data.**

**The requirement** - There are only four potential sources of information on water quality in the regional aquifer - Redden Spring and IPA-1, IPA-2, and IPA-3. All other springs are in the perched aquifers, not in the deeper, saturated, regional aquifer. Under Directive Tech-004 (Tab 17), UEI was required to collect water quality data from these sources.

**UEI's submission was deficient** - There has never been a single water quality sample from any of the IPA wells (Final TA pg 37 Bates 652, Tab 27). This means that UEI and the Division are attempting to characterize the water quality of the entire regional aquifer with limited data from only a single spring.<sup>10</sup>

In the final TA (pg. 36), the Division states "RS-1 and RS-2 were sampled once a year in 1978, 1979, and 1980 and analyzed for most major chemical constituents"

---

<sup>10</sup> There appears to be some confusion as to the designation to Redden Spring. For example the CHIA refers to it as RS-2 (pg. 18, Bates 6433, Tab 42), but the TA refers to it as RS-1 (pg. 36 Bates 651, Tab 43). Furthermore, the identification of the spring has been altered on the laboratory data sheets in Appendix 7-2 of the PAP (Bates 5570, 5578, 5579, 5581, 5584, 5585, 5598, and 5599, Tab 44) raising the question of the validity of these data.

(Bates 651, Tab 43). On this same page, the Division makes reference to Directive Tech-004 with regard to analyses from other springs. Furthermore, in earlier TA's the Division states "The quarterly samples from Redden Spring were analyzed for all *required* parameters except total manganese" (emphasis added), and refers to DOGM's guidelines (TA # 1, Bates 2506, Tab 45). Table 1 of the final TA indicates that samples may have been taken from Redden Spring in 1981-1983 and in 1997 (Bates 656, Tab 46). However as pointed out in TA # 4 (Bates 1658, Tab 47), the analyses did not include total manganese, a *mandated* parameter, according to Tech-004 (emphasis added). It is very clear that the Division requires baseline water quality samples be analyzed for the "required" and "mandated" parameters in Tech-004. The samples from Redden Spring do not meet these standards established by the Division. In addition, Tech-004 requires "Baseline information shall be collected quarterly for a minimum of two years prior to permit issuance. Data should be sufficient to demonstrate seasonal variation in quality and quantity for each source." (Directive No. Tech-004, page 9, Tab 17).

**Conclusion** - In my opinion, one sample location is not sufficient in order to characterize the water quality of the regional aquifer within the proposed mine and adjacent area. UEI's sporadic sampling is not sufficient to establish current baseline at this spring for either water quantity, or water quality.

**Impacts** - UEI has failed to characterize the existing water quality of the regional aquifer. Without these data, it will be impossible to assess the impacts related to the mining operation.

**D. THE PROBABLE HYDROLOGIC CONSEQUENCES DETERMINATION ("PHC") IS SCIENTIFICALLY FLAWED AND LACKING DATA OR SUBSTANCE**

Rule 728.100 provides as follows:

*728.100. The permit application will contain a determination of the PHC of the proposed coal mining and reclamation operation upon the quality and quantity of surface and ground water under seasonal flow conditions for the proposed permit and adjacent areas.*

**12. The PHC Determination is flawed because required baseline data were not submitted.**

*The requirement* - Rule 728.200 states "The PHC determination will be based on baseline hydrologic, geologic and other information collected for the permit application and may include data statistically representative of the site." Rule 728.310 requires that the PHC determination include findings on whether adverse impacts may occur to the hydrologic balance. Rule 728.320 requires that the PHC determination include findings on whether acid-forming or toxic-forming materials are present that could result in the contamination of surface- or ground- water supplies.

*UEI's submission is deficient* - The PHC is scientifically flawed because the baseline data required under Rule 724.100 and Rule 724.200 have not been provided by UEI, as explained more fully in Sections 3, 4, 5, 6, 8, and 11 above.

The PHC fails to satisfy Rule 723.310 because there are no baseline data and because there is a complete lack of understanding of the movement water in the regional aquifer, including a complete failure to identify the discharge area (the "water outflow"), as required. UEI simply fails to address Rule 728.320 in the PHC; in fact, the words "acid-forming" and "toxic-forming" never appear in the PHC (Bates 5648-5658, Tab 40). This gross failure to address Rule 728.320 makes the PHC, by definition, incomplete.

**Conclusion** - The permit application must contain a determination of the probable hydrologic consequences of the proposed mining operation. UEI has failed to provide this determination. Without the missing information, the PHC cannot (and does not) include findings on whether adverse impacts may occur to the hydrologic balance, as required by Rule 728.310.

**Impacts** - The PHC is intended to provide crucial findings on impacts to the hydrologic balance. Without these findings, the Division cannot assess the impacts that the proposed mining operation will have.

#### **E. THE CHIA IS SCIENTIFICALLY FLAWED**

##### **13. The CHIA fails to consider a meaningful and reasonable area of impacts.**

**The requirement** – Coal Mining Rule 729.100 provides:

*The Division will provide an assessment of the probable cumulative hydrologic impacts of the proposed coal mining and reclamation operation and all anticipated coal mining and reclamation operations upon surface- and ground-water systems in the cumulative impact area. The CHIA will be sufficient to determine, for purposes of permit approval whether the proposed coal mining and reclamation operation has been designed to prevent material damage to the hydrologic balance outside the permit area. The Division may allow the applicant to submit data and analyses relevant to the CHIA with the permit application.*

The Division states that the first objective of a CHIA document is to identify the Cumulative Impact Area (CIA) (CHLA, pg. 4, Bates 805, Tab 48). Under Rule 645 100.200, "Cumulative Impact Area" means the area, including the permit area, within which impacts resulting from the proposed operation may interact with the impacts of all anticipated mining on surface and groundwater systems. The CHLA must determine whether the proposed coal mining operation has been designed to prevent material damage to the hydrologic balance within the CIA.

***The CHLA is deficient*** - A fundamental part of understanding the hydrologic balance is knowing the area of discharge of aquifers (the water outflow). The CHLA prepared by the Division for the proposed Lila Canyon Mine, however, completely fails to include the area where the regional aquifer discharges and the impacts that may occur as a result of mining

The PAP (pg. 7-7, Bates 5341, Tab 39) states "Although unconfirmed locally, it is believed that the groundwater flow direction in the regional aquifer follows the structural dip ...". The structural dip is to the east at 11 to 14 percent (PAP pg. 6-12, Bates 5168, Tab 49). Plate 7-1 (Bates 5659, Tab 35) and Figure 7-1 (Bates 900637, Tab 50) both show the top of the regional aquifer sloping towards the east, and thus confirm UEI's statement that this is the general direction of ground water movement.

The CIA boundary for the CHLA has been arbitrarily established by the Division at the topographic divide immediately to the east of the proposed permit area (CHLA Figures 3 and 4, Bates 806, 808, Tab 51), approximately 1,700 feet east of the area to be mined. This limited area cannot possibly suffice for considering material damage to the hydrologic balance outside the permit area. Most alarming, by its arbitrary placement of the CIA boundary, the Division completely ignores the fact that the regional aquifer is flowing to the east.

***The boundary should include Range Creek impacts*** - By placing the boundary at this arbitrary topographic divide, the Division also fails to include and consider any impacts to the Range Creek drainage, located east of this divide. In the final TA (pg. 43, Bates 658, Tab 52) the Division states that Range Creek is 6 miles east of the Lila Canyon permit area and separated from it by the drainage divide at the top of the Roan

Cliffs. This is absolutely incorrect and illustrates the Division's lack of understanding of basic physiographic relations in the area. According to the U.S. Geological Survey (Price 1:250,000 Topographic Map, a portion of which is shown in Tab 53), the Roan Cliffs are located approximately 4 miles *east* of Range Creek, not between the Lila Canyon permit area and Range Creek. More importantly, the Range Creek drainage is as close as 1,700 feet from the permit area. Given the proximity of the Range Creek drainage to the mine permit area, the fact that the ground water flows into the Range Creek drainage, and the fact that there will be impacts to water flow in the regional aquifer as a result of mining activities, the CIA absolutely must be expanded to Range Creek.

*The Division concluded Range Creek should be included in the CIA* - The Division originally believed that Range Creek could be impacted as a result of mining and considered the lack of discussing it as a deficiency in TA # 1 (Bates 2506, Tab 45). In TA # 2, the Division even considered a lack of baseline data for Range Creek as an outstanding deficiency (Bates 2311, Tab 27). The Division later determined that monitoring of Range Creek was not necessary; however, the record is devoid of any hydrologic data that could have been the basis for this later determination. In fact, UEI acknowledges that there may be impacts to Range Creek as a result of its mining operations. In a summary of outstanding deficiencies (Bates 901433, Tab 54), the Division states, "The applicant should submit plans to include monitoring sites Range Creek above and below the extent of mining". UEI responded to this deficiency on March 10, 2000 by stating, "Should significant underground water be encountered, UEI will imitate {sic} an internal water monitoring program for Range Creek. The plan is not intended to become part of the MRP" (Bates 901433, Tab 54). First, monitoring during



operations without having first established baseline will not answer the question of whether there are impacts related to the mining operation. Second, if the Division and UEI acknowledge that there is the possibility of impacts, Range Creek must be included in the CIA, the required baseline data must be acquired, and the monitoring must be included in the MRP.

*Effect of the deficiency* - Mining will impact the regional aquifer, as is noted several times in the PAP and CHIA. The PAP (pg. 7-8, Bates 5342, Tab 55) states that the Sunnyside coal bed lies within the regional aquifer. It also states that water levels in the regional aquifer are above the coal seam, that mining will intercept this water, and that pumping is likely. These statements are repeated in Appendix 7-3. The CHIA (pg. 22, Bates 6437, Tab 41) acknowledges that the proposed Lila Canyon Mine will produce mine water (intercepted from the regional aquifer). Due to the lack of baseline data for the Lila Canyon mine (as discussed above), UEI and the Division have relied on similarities to the nearby Solder Canyon, Sunnyside, and Horse Canyon Mines, each of which intercepted the regional aquifer and had discharges as high as several hundred gallons per minute (CHIA pg. 23, Bates 6438, Tab 41). It is clear that the regional aquifer will be intercepted by mining activities, and that there will be material damage to the hydrologic balance.

UEI shows a cross section through a portion of the mine area on Figure 7-1 (Bates 900637, Tab 50). While this information is taken to be correct, it fails to portray the areas to the east of the mining operation. For the Division to evaluate impacts to the regional aquifer as a result of the drawdown that will occur, it must consider the area down gradient from the mine. The U.S. Geological Survey has prepared a cross-section

that is a more accurate portrayal of the regional aquifer (Lines, 1985) (Tab 56). The most significant aspect of this USGS cross section is that it shows the discharge area of the aquifer. In the topographic setting of the Lila Canyon Mine, this would be Range Creek.

Published literature demonstrates that impacts to Range Creek are likely. Lines (1985), in discussing the possible effects of underground mining in the Trail Mountain Area, states, "Water produced in the mines will be derived primarily from a decrease in storage in the aquifer. Several hundred feet of aquifer above the mines could be dewatered, and the cone of depression could extend *several miles* from the mines after a few years" (emphasis added). In discussing the hydrology of the Price River Basin, Waddell and others (1986) state, "Mining activities may affect the distribution of flow along stream reaches by direct interception of water from a stream or by interception of ground water that is percolating to the stream". Lines and others (1984) report, "Hydrologic impacts related to coal mining in the area are mainly due to dewatering of mines and land subsidence. Dewatering of coal mines changes the flow pattern through coal-bearing aquifers, and storage in aquifers is reduced". In a supplemental hydrogeologic study for the Soldier Canyon Mine, SHB (1986) report, "Groundwater emerging from springs and seeps provides most of the base flow to regional streams," and "Groundwater from the Blackhawk Formation is reported to be the principal base flow component to Soldier Creek during periods of low precipitation." Given the similarities between Soldier Creek and Range Creek, it is almost certain that ground water from the Blackhawk Formation is the principal base flow component to Range Creek as well.

**Conclusion** - The Division had access to information indicating the relation between the regional aquifer and local streams. The Division knew that both the regional structure and the regional aquifer dip to the east towards Range Creek. The regional aquifer must discharge *somewhere*. The Division knows that the regional aquifer will be impacted by mining, specifically that the top of the aquifer will be lowered as a result of mining. This *will* have an impact on the discharge area. Thus, there is absolutely no hydrologically justifiable reason for delineating the CIA boundary 1,700 feet away from the permit area. In my opinion, by arbitrarily placing the CIA boundary where it has, the Division has failed to assess whether the proposed coal mining and reclamation operation has been designed to prevent material damage to the hydrologic balance outside the permit area. Thus, the CHIA does not comply with Rule 729.100.

**Impacts** - Impacts include changes to aquifer flow patterns, dewatering seeps and springs, and impacting the base flow to regional streams, all outside (just east of) the small area currently considered in the CHIA. Both the Division and UEI at one point acknowledged that impacts to Range Creek are possible, and that monitoring is necessary. UEI is confident enough that there will be impacts that it committed, as part of the record, to commence monitoring of Range Creek if mine water is produced. However, without pre-mining baseline data, it will be impossible to make any meaningful interpretations of the monitoring data and assess mining impacts. Even more important, without analysis of pre-mining data for possible impacts, the Division cannot fulfill its responsibility to determine cumulative impacts and consider whether and how the permit should be issued.

15. **The CHIA fails to consider the effect of faults and is based on incomplete baseline hydrologic descriptions.**

*The requirement* – As stated in Rule 729.100: “The CHIA will be sufficient to determine, for purposes of permit approval whether the proposed coal mining and reclamation operation has been designed to prevent material damage to the hydrologic balance outside the permit area.”

*The CHIA is deficient* – As documented in Section 9 above, there are several east-west trending faults in the proposed mining area. All of the faults are shown on Plate 7-1 as extending towards the east, and there is no logical geologic explanation for them not continuing into the Range Creek Drainage. By arbitrarily placing the CIA boundary at the drainage divide, the Division fails to address the affects that mining will have on the ground water system related to the faults. In addition, the Sunnyside fault is shown on Plate 6-1 (Bates 5326, Tab 38) to intercept the northern boundary of the permit area; however UEI and the Division fail to determine its location within the permit area or CIA.

Because the Division relied upon the “baseline data” that existed in the PAP, it fails to meet the objective of describing the hydrologic system. The deficiencies in the baseline data for water quality and quantity, for both the surface and ground water resources have been discussed above in Sections 3, 4, 5, 6, 8, and 11.

*Conclusion* – By failing to consider the location of the faults and their affects on the ground water system in the permit area or in the Range Creek Drainage, the CHIA does not comply with Rule 729.100. Without baseline data, the Division cannot provide a description of the hydrologic system, and cannot perform an assessment of the probable cumulative hydrologic impacts, and thus fails to satisfy Rule 729.100.

**Impacts** - There are several documented seeps and springs and water rights in the Range Creek Drainage (Plate 7-3, Bates 5661, Tab 57). The CHIA fails to address their association with the faults or whether there could be material damage to them as a result of mining operations. The proposed coal mining operation may cause material damage to the hydrologic balance outside the permit area. The CHIA fails to assess this damage because there is an incomplete description of the hydrologic resources.

#### F. STREAM BUFFER ZONES

16. The Division has failed to analyze the impact of mining on perennial or intermittent streams.

**The requirement** - The Coal Mining Rules require analysis of impact of mining on intermittent or perennial streams:

*Rule 731.610. No land within 100 feet of a perennial stream or an intermittent stream will be disturbed by coal mining and reclamation operations, unless the Division specifically authorizes coal mining and reclamation operations closer to, or through, such a stream. The Division may authorize such activities only upon finding that:*

*731.611. Coal mining and reclamation operations will not cause or contribute to the violation of applicable Utah or federal water quality standards and will not adversely affect the water quantity and quality or other environmental resources of the stream.*

This rule is very clear: coal mining and reclamation operations close to, or through, an intermittent stream can be authorized only upon finding that the operation will not adversely affect the water quantity and quality.

**The Division has failed to make the required analysis** - On page 101 of the final TA, the Division states "There will be mine development within 100 feet of the Lila Canyon channel and mining beneath Little Park Wash" (Bates 716, Tab 58). Both of these are classified as intermittent streams; however, the Division finds that mining will not adversely affect the water quality or quantity of these streams (Bates 716, Tab 58).

To make such a finding, one must evaluate the existing water quality and quantity in these streams and next evaluate the proposed mining operation plan to see how these operations will affect water quality and quantity. As there are *no* existing data on the water quantity or quality *anywhere* in Lila Canyon or Little Park Wash (Final TA, pgs. 43-44, Bates 658-569, Tab 59), this procedure was not, and cannot yet, be followed.

**Conclusion** - Without knowing what the existing water resource is, it is absolutely impossible to assess the affects that mining operations will have. Without these data, the Division's finding is baseless and violates Rules 731.610 and 731.611.

**Impacts** - During times of discharge, Lila Canyon and Little Park Wash are significant sources of water in an arid environment. Mining operations will likely impact these streams and therefore, the Division must evaluate existing water quality and quantity conditions in order to assess the potential impacts.

## V. LIST OF REFERENCES

Galloway, W. E., and Hobday, D. K., 1983, Terrigenous Clastic Depositional Systems - Applications to Petroleum, Coal, and Uranium Exploration: Springer Verlag, New York, New York.

Hintze, L., H., 1988, Geologic history of Utah: Brigham Young University Geology Studies, Special Publication 7, Provo, Utah.

Lines, G. C., and others, 1983, Hydrology of Area 56, Northern Great Plains and Rocky Mountains coal provinces, Utah: U.S. Geological Survey Open-File Report 83-38.

Lines, G. C., 1985, The ground-water system and possible effects of underground coal mining in the Trail Mountain area, central Utah: U.S. Geological Survey Water-Supply Paper 2259.

Sergent, Hauskins & Beckwith, 1986, Supplemental hydrogeologic study Soldier Canyon Mine Carbon County, Utah: Report prepared for Sunedco Coal Company, October 1986.

U.S.G.S., 1977, National handbook of Recommended Methods for Water-Data Acquisition: U.S. Geological Survey, Reston, Virginia.

Page 39

Waddell, K. M., Dodge, J. E., Darby, D. W., and Theobald, S. M., 1986, Hydrology of the Price River Basin, Utah with emphasis on selected coal-field areas: U.S. Geological Survey Water-Supply Paper 2246.

Elliott W. Lips 11/26/01

Elliott W. Lips, Ph.D. A.B.D., P.G.  
Adjunct Associate Professor  
University of Utah



## **Exhibit C**

**BEFORE THE BOARD OF OIL, GAS AND MINING  
DEPARTMENT OF NATURAL RESOURCES  
STATE OF UTAH**

In the Matter of the	)	
Request for Agency Action	)	
By Petitioner Southern Utah	)	Docket No. 2001-027
Wilderness Alliance Regarding the	)	
Division of Oil, Gas and Mining's	)	
Approval of the Lila Canyon	)	Cause No. C/007/013-SR98(1)
Significant Permit Revision	)	
C/007/013-SR98(1)	)	
Filed by UtahAmerican Energy, Inc.	)	

**DECLARATION OF DR. RON KASS**

Dr. Ron Kass declares the following:

1. My name is Dr. Ron Kass, I am of over twenty-one years of age, of sound mind, capable of making this declaration, and I am personally acquainted with the facts herein stated.
2. My curriculum vitae is attached and incorporated herein. I am currently a resident of Springville, Utah. I am a graduate of New Mexico State University with a doctorate degree in plant ecology, and I have a Masters degree in taxonomy from Brigham Young University. I have conducted research, consulted, and have taught university classes in plant identification at BYU and New Mexico State University. I have worked for the Bureau of Land Management, and have been employed by Dr. Stanley Welsh, professor of botany at BYU. Since 1988 I have owned Intermountain Ecosystems, a consulting firm. This Declaration is filed in support of Petitioner's Request for Agency Action in the above captioned matter.
3. I have approximately ten years field experience in the Carbon and Emery County area, and I am familiar with the Lila Canyon area and its plant resources.
4. Based on my knowledge and a review of the relevant documents, I believe that the information in the permit application for the proposed Lila Canyon Mine is insufficient to adequately assess the threatened, endangered and sensitive plant species, and the impact to such species.

5. In particular the search for Despain footcactus (*Pediocactus despainii*) should have been conducted during the last week of April or 1<sup>st</sup> week of May. This species is very difficult to locate in its vegetative condition and only a real expert should conduct these searches during non-flowering times.
6. The Book Cliff's blazing star (*Adiantum multicaule* var. *librino*) should have been included in the inventory of this area, as it is known to exist at the mouth of Horse Canyon and is a Colorado Plateau endemic. This species is on the Bureau of Land Management (BLM) special status list, and it was also listed as G3T1 by the Utah Rare Plant Workshop in 2000.
7. I, and other botanists in the state, recommend that only highly qualified botanists should conduct rare plant surveys, especially during sub-optimal times. The May 1998 inventory prepared by EIS Consulting reveals that the specimen of canyon sweetvetch (*Hedysarum occidentale* var. *canone*) was taken to the BLM to be positively identified. If qualified botanists were doing the field work for EIS Consulting, there should be no need to consult the BLM for positive identification. Regardless, there are no botanists on staff at the BLM in Price. Indeed it is imperative that a qualified botanist performs the field work in order to identify new taxa, range extensions, and other rare and disjunct taxa possible at a given site.
8. In addition, although the documentation indicates that the proposed project may dewater seeps and springs, there is no indication that such seeps and springs were inventoried for baseline information on plant species dependant on these water sources. Such water sources are important refugia for locating disjunct species and extensions on habitat, and should be inventoried throughout July and August.
9. In summary, because the surveys performed for the proposed action either neglected to consider certain species, or were performed inadequately and at inappropriate times during the year, there is no possible way to determine the potential impacts due to the mining activities.

I DECLARE, under penalty of perjury, the foregoing to be true and correct.

Date 11-29-2001

  
Dr. Ron Kass, Ph. D.

CURRICULUM VITAE  
RONALD J. KASS, PH.D.



270 East 1230 North  
Springville, Ut. 84663  
801-489-4590 Fax 801-489-8236

RONALD J. KASS

270 EAST 1230 NORTH  
SPRINGVILLE, UTAH 84663  
(801) 489-4590 B (801) 489-8236 F  
Email-Intermteco@aol.com

EDUCATION

- Ph.D. New Mexico State University, Las Cruces, NM. Depart. of Biology, Plant Community Ecology, 1992.  
M.S. Brigham Young University, Provo, UT. Depart. of Botany and Range Science, Plant Taxonomy, 1983.  
B.S. Brigham Young University, Provo, UT. Depart. of Zoology, Wildlife Ecology, 1978.

PROFESSIONAL EXPERIENCE

Principal-Intermountain Ecosystems, LLC.  
25 years experience in: Endangered Species Inventory and Monitoring, Quantitative Vegetation Sampling and Reclamation, Botanical and Wildlife inventory, Wetland Delineation and Mitigation. Compliance with NEPA, USACOE, EPA, FERC, SMCRA, BLM, USFS and USFWS guidelines.

PRINCIPLE PROJECTS

ENDANGERED SPECIES

- 2001 SWCA/Northwest Pipeline. Rockies Displacement Expansion, Wyo. and Idaho.  
HDR/UDOT Engineering, SLC, Ut. Southern Corridor EIS. St. George, Ut.  
RB&G Engineering, Provo, Ut. American Fork Trail T&E inventory.  
Sear-Brown Group/UDOT. US 191 EIS, Moab Ut.  
Sear-Brown Group, Salt Lake City, Ut. Man of War Bridge BA. St. George, Ut.  
City of St. George, Ut. T & E clearance for Southwestern willow flycatcher.  
UDOT Roadside Vegetation Inventory, Region 2.  
BLM. Price Area Office. Status reports for *S. wrightiae* and *C. creutzfeldtii*.  
Private Fuels Storage Facility, LLC. Expert witness for rare plants and vegetation.
- 2000 Sear-Brown Group, Salt Lake City, Ut. T & E clearance for Riverdale Bike Path.  
Sear-Brown Group, Salt Lake City, Ut. T & E clearance for Man of War Bridge, St. George, Ut.  
RB&G Engineering/UDOT, Provo, Ut. T&E clearance for Orem Center St. Project.  
RB&G Engineering/UDOT Provo, Ut. T&E clearance for 4 Utah County Bridges.

- SWCA, Salt Lake City, Ut. Solitude & DMB ski resort rare plant inventory.
- Entranco, Salt Lake City, Ut. Atkinville Interchange T&E inventory. St George, Ut.
- Entranco, Salt Lake City, Ut. Southern Corridor Biological Assessment. St George, Ut.
- Environmental Management Associates, Elko Nevada. BLM Land Exchange T&E inventory.
- W. W. Clyde, Springville, Ut. Wolf Creek Rd. T&E & raptor clearance, Tabiona, Ut.
- W. W. Clyde, Springville, Ut. North Glendale Gravel Pit. T&E clearance, Kane, Co., Ut.
- Pentacore, Midvale, Ut. *Spiranthes diluvialis* monitoring for American Fork Mall.
- Pentacore, Midvale, Ut. *Spiranthes diluvialis* inventory Provo Industrial Park.
- SWCA, Salt Lake City, Ut. Williams Corps. Aspen pipeline T&E inventory.
- Sear-Brown Group, Salt Lake City, Ut. T & E clearance for Provo 800 North.
- 1999 USDA, Uinta National Forest. King's woody aster (*Machaeranthera kingii*) inventory.
- Michael Baker Jr., Salt Lake City. T&E clearance for fiber optic line-Colo. & Ut.
- Sear-Brown Group, Salt Lake City, Ut. T&E clearance River Road Project, St. George, Ut.
- W. W. Clyde, Springville, Ut. T&E clearance Green River gravel pit. Green River, Ut.
- W. W. Clyde, Springville, Ut. T&E clearance for Snow Basin-Trapper Loop Road. Odgen, Ut.
- Stone & Webster, Denver, Co. Rare plant inventory. Skull Valley Private Storage Facility, Tooele Ut.
- UDOT & Entranco, Salt Lake City, Ut. Southern Corridor Desert Tortoise (*Gopherus agassizii*) inventory. St George, Ut.
- Williams Corp. Salt Lake City, Ut. Southwestern willow flycatcher (*Empidonax traillii eximius*). Mancos Loop Pipeline. Mancos, Co.
- SWCA, Salt Lake City, Ut. Williams Pipeline Co. Aspen Pipeline T&E.
- 1998 Orem City, Ut. Ute ladies tresses (*Spiranthes diluvialis*) inventory, restoration, and monitoring.
- Burns & McDonnell Kansas City, Mo. *Spiranthes diluvialis* inventory for DM&E railroad. Wyo. & S. Dakota.
- Engineering Planning Group, Draper, Ut. *Spiranthes diluvialis* inventory, American Fork, Ut.
- Stone & Webster, Denver, Co. Rare plant, burrowing owl, and loggerhead shrike inventory. Skull Valley Private Storage Facility.
- BLM. Richfield District, Ut. Rare plant, burrowing owl, Utah prairie dog and noxious weed inventory. Wayne Co.
- HDR, & Baseline Data. Legacy Highway BA. Salt Lake City, Ut.

- Pic-Technologies, Denver, Co. Wetlands & T&E. Ultra Natural Gas EIS. Pinedale, Wy.
- SWCA, Salt Lake City, Ut. Williams Pipeline Co. Aspen T&E inventory, Price, Ut.
- SWCA, Salt Lake City, Ut. Questar Gas Co., Rare plant inventory, Price, Ut.
- 1997 Continental Lime Co., Delta, Ut. Rare plant inventory Cricket Mt. Mine Expansion.
- SWCA, Salt Lake City, Ut. Questar Pipeline. *Spiranthes diluvialis* inventory. Genola, Ut.
- River Gas Inc. Northport, Al. T&E inventory. Price Coalbed Methane.
- BLM. Ferron Gas EIS Rare plant inventory. Price, Utah.
- Northern Geophysical of America, Englewood, Co. Rare plant inventory Salina, Ut.
- BLM. Wright fishhook cactus (*Sclerocactus wrightiae*) demographic monitoring.
- HDR & Baseline Data. Legacy Highway EIS., Salt Lake City, Ut.
- 1996 McMurry Oil Company, Big Piney, Wy. Rare plant and logger head shrike inventory. Jonah EIS.
- Continental Lime Co., Delta, Ut. Rare plant inventory. Cricket Mt. Mine Expansion.
- Brush Wellman, Delta, Ut. Rare plant inventory. Topaz Mine Expansion.
- Kennecott Copper and The Nature Conservancy, Salt Lake City, Ut. Northern Oquirrh Mts. Bio-inventory.
- USFS Black Hills Natl. Forest, Sundance Wy. Rare plant inventory Bear Lodge N. F. Timber EA.
- Chandler Oil, Denver Colo. Rare plant inventory, Emery Co.
- Engineering Planning Group, Draper, Ut. Endangered species inventory, Spotted frog (*Rana pretiosa*) Ute ladies' tresses (*Spiranthes diluvialis*) American Fork, Ut.
- Baseline, Inc. Orem, Ut. Western Transportation Corridor MIS & T&E species.
- Northwest Pipeline, Salt Lake City, Ut. Rare plant inventory, Evanston, Wy.
- Mariah Assoc., Laramie, Wy. U.S. Gypsum Co., Kimball Draw EA.
- Golder Assoc., Denver, Co. Phelps Dodge Co. Chino Mine Expansion EA, Silver City, NM.
- 1995 USFS Dixie Natl. Forest, Cedar City, Ut. Status report for *Penstemon pinorum*.
- Northern Geophysical of America, Englewood, Co. Rare plant inventory Salina, Ut.
- Balcron Oil and Subsurface Exploration, Pasadena, Ca. Rare plant inventory Snake Valley Seismic Project. Millard Co., Ut.
- Northwest Pipeline Inc., Salt Lake City, Ut. Rare plant inventory for Piceance Creek Replacement Project. Rangely Co.
- Union Telephone Co., Lonetree, Wy. Rare plant and logger head shrike inventory.

1994

- U.S. Gypsum Co, Chicago, Ill. Rare plant inventory: proposed Gypsum Mine in San Rafael, Ut.
- Balcon Oil and Subsurface Exploration, Pasadena, Ca. Rare plant inventory: Snake Valley Seismic Project, Millard Co, Ut.
- Resource Management International, Sacramento, Ca. Rare plant inventory: Ute ladies's tresses (*Spiranthes dihrvialis*). Central Utah Project, Nephi Basin, Ut.
- CH2M-Hill & Mt. Nebo Scientific, Springville Ut. Rare plant inventory: Ute ladies's tresses (*Spiranthes dihrvialis*). Central Utah Project, Uintah Basin, Utah.
- Baseline, Inc., Orem, Ut. Rare plant inventory: Ute ladies's tresses (*Spiranthes dihrvialis*) on the UDOT Myton and Currant Creeks Bridge replacement.
- Wyoming Fish and Game, Cheyenne, Wy. Rare plant inventory: Big Piney big game habitat enhancement project. Pinedale, Wy.
- BLM, Rock Spring District Office. Status survey and habitat management plan for bastard draba milkvetch (*Astragalus drabelliformis*) in the Upper Green River Basin, Wy.
- River Gas of Utah, Northport, Al. T&E inventory: Price Coalbed Methane EIS.
- Freston, Ostler, Vernon & Assoc., Vernal, Ut. Rare plant inventory for Ute ladies's tresses (*Spiranthes dihrvialis*), Ashley Creek Bridge replacement.
- Enron Oil & Gas Corporation, Houston, Tx. T&E inventory: Upper Green River Basin.
- Chevron, USA. Houston, Tx. Rare plant inventory: southwestern Wyo.
- Mobil Oil Corporation, Bakerfield, Ca. Rare plant inventory: LaBarge oil fields.
- Enviroserve Assoc., Fruit Heights, Ut. Rare plant inventory: Ute ladies's tresses (*Spiranthes dihrvialis*) AT&T underground powerline: Strawberry Reservoir, Ut.
- Freston, Ostler, Vernon & Assoc., Vernal, Ut. Rare plant inventory: Ute ladies's tresses (*Spiranthes dihrvialis*), Fort Duchesne, Ut.
- Heitzman Drill Services, Casper, Wy. Anadarko Petroleum EA., Helper Coalbed Methane EA-- rare plants. Helper, Ut.
- Endangered Plant Studies, Orem, Ut. UDOT. LaVerkin Creek Bridge Replacement BA.
- Williams Field Services, Salt Lake City, Ut. Rare plant inventory Big-Piney-LaBarge oil fields.
- 1993
- U.S. Justice Dept., Denver Co. Expert witness for Zion National Park Virgin River Ajudication. Expert for hanging gardens and rare plants.
- Mobil Oil Corporation & Heitzman Drilling, Casper, Wy. Rare plant inventory: LaBarge oil fields.
- Tecaco Inc. Heitzman Drilling. Stagecoach Draw EIS--rare plants. Farson, Wy.
- Mobil EA: LaBarge Oil Field Expansion Program. Rare plants
- Endangered Plant Studies, Orem, Ut. Pacific-Corp., Salt Lake City, Ut. Ismay and



- Mexican Water Powerline EA, Navajo Tribal Lands, Window Rock, Az.
- Williams Field Services. Green River, Wy. Rare plant inventory: Cathodic Protection Systems.
- Geo-Marine Inc., Plano, Tx. Rare plants and burrowing owls inventory: Wendover Nev.
- Chevron, USA. LaBarge, Wy. Rare plant inventory: LaBarge oil fields
- B LM, Salt Lake City, Ut. Monitoring and demographics for Wright Fishhook cactus (*Sclerocactus wrightiae*).
- Mariah Associates, Inc., Laramie, Wy. Rare plant inventory: Cutthroat Gas plant. Granger, Wy.
- Enron Oil & Gas, Big Piney, Wy. Rare plant inventory, LaBarge, Wy.
- Pic-Technology, Denver, Co. Rare plant inventory: Basin Exploration. Big Piney, Wy.
- Utah Power and Light, Salt Lake City, Ut. burrowing owl and black footed ferret inventory: Navajo Reservation, Aneth, Ut.
- Pic-Technology, Denver, Co. Rare plant inventory: Northwest Pipeline Inc. Big Piney, Wy.
- Endangered Plant Studies, Orem, Ut. Utah Prairie Dog (*Cynomys parvidens*) inventory: Beaver, Ut.
- 1992 Endangered Plant Studies, Orem, Ut. Desert Tortoise (*Gopherus agassizii*) inventory: Walmart Inc. Wash. Co., Ut.
- Utah Power and Light Co., Salt Lake City, Ut. Rare plant inventory: Dixie N.F. Enterprize, Ut.
- BLM, Salt Lake City, Ut. House Range rare plant inventory.
- Ute Indian Reservation, Fort Duchesne, Ut. Rare plant inventory: *Spiranthes dihrvialis*.
- USFWS, Denver, Co. Status reports: *Eriogonum soredium*, *Trifolium andersonii* var *friscanum*, and *Lepidium osleri*.
- Endangered Plant Studies, Orem, Ut. Pacific-Corp. EA: transmission corridor. BLM and Dugway Proving Ground.
- 1991 Endangered Plant Studies, Orem, Ut. Pacific-Corp. BA: transmission corridor for Dixie National Forest. Versar Engineering, Orem, Ut., UDOT. *Spiranthes dihrvialis* inventory, U.S.Highway 89.
- Pic-Technology, Denver, Co. Rare plant inventory: Northwest Pipeline Inc., Wyo., Ut and Id.
- Wayne Co. Water Conservancy District, Salt Lake City, Ut. *Spiranthes dihrvialis*. Capital Reef National Park.
- 1990 BLM, Richfield District, Ut. Rare plant inventory: Warm Springs and House Range Resource Areas.
- Utah Heritage Program, Salt Lake City, Ut. Rare plant inventory: Tushar Mountains, Ut.
- BLM, Salt Lake City, Ut. Rare plant inventory: Great Basin and Deep Creek Mts.
- Chusa Energy Co. Farmington, NM. *Sclerocactus mesa-verde*. Navajo Indian Reservation.

- 1989 Endangered Plant Studies, Anadarko Petroleum Company, Denver, Co. Rare plant inventory: Lonetree, Wy.  
BLM, Salt Lake City, Ut. Rare plant inventory: San Rafael Swell, Ut.  
Chusa Energy Company, Farmington, NM. Black-footed ferret inventory: Navajo Indian Reservation, Blanding, Ut.
- 1988 Endangered Plant Studies, Orem, Ut. Utah Power and Light. Rare plant inventory: Blanding, Ut.  
BLM, Salt Lake City, Ut. Rare plant inventory: San Rafael Resource Area, Ut.  
Endangered Plant Studies, Orem, Ut. Seis-Pro Corp., Billings, Mt. Rare plant inventory: Nucla, Co.  
Endangered Plant Studies, Orem, Ut. NPS, Springdale, Ut. Botanical inventory: Zion National Park.  
Endangered Plant Studies, Orem, Ut. Questar Pipeline Inc., Salt Lake City, Ut. Rare plant inventory in Brown's Park, Ut.
- 1987 Endangered Plant Studies, Orem, Ut. NPS, Springdale, Ut. Botanical inventory: Zion National Park.  
Endangered Plant Studies, Orem, Ut. Wayne Co. Water Conservancy District. Rare plant inventory: proposed Fremont River Dam.  
Endangered Plant Studies, Orem, Ut. Utemco Mineral Corp., Uravan, Co. Rare plant inventory: radioactive waste repository.  
Endangered Plant Studies, Orem, Ut. Plateau Mining Corp., Wattis, Ut. Rare plant inventory.
- 1986 Endangered Plant Studies, Orem, Ut. NPS, Springdale, Ut. Botanical inventory: Zion National Park.  
Neese Investigations, Salt Lake City, Ut. *Sclerocactus wrightiae*. BLM, Richfield, Ut.
- 1985 El Paso Natural Gas Company. Rare plant inventory: natural gas line in NM and AZ.  
Transwestern Pipeline Corporation. Rare plant inventory: natural gas line, NM and AZ.  
Endangered Plant Studies, Orem, Ut. Wayne Co. Water Conservancy. Rare plant inventory: Fremont River Dam, Ut.
- 1984 Endangered Plant Studies, Orem, Ut. Amoco-Badger Oil Co. Vernal, Ut. Rare plant inventory.  
Bio-West, Logan, Ut. Exxon USA, Midland Tx. Riley Ridge EIS.  
Bio-West, Logan, Ut. San Juan Basin Coal, EIS, Farmington, NM.  
Bio-West, Logan, Ut. Gulf Oil Corp, Houston, Tx. EIS. Commissary Ridge, Wy.  
Endangered Plant Studies, Orem, Ut. Utah Power and Light. Rare plant inventory: Wash. Co., Ut.  
Endangered Plant Studies, Orem, Ut. UDOT. Rare plant inventory: Interstate 70 in Emery Co., Ut.  
Endangered Plant Studies, Orem, Ut. Utah Power and Light. Rare plant & Desert Tortoise (*Gopherus agassizii*) inventory: Wash. Co., Ut.
- 1983 Endangered Plant Studies, Orem, Ut. Utah Power and Light. Rare plant inventory: Uinta Co., Wy.

- Endangered Plant Studies, Orem, Ut. NGA, Engelwood, Co. Rare plant inventory: Price, Ut.
- Endangered Plant Studies, Orem, Ut. Chevron USA., Kemmerer, Wy. Rare plant inventory.
- Endangered Plant Studies, Orem, Ut. Bectel Corp., San Francisco, Ca. Rare plant inventory: railway facility  
Lavender Canyon Nuclear Waste Repository.
- Endangered Plant Studies, Orem, Ut. Colorado-Ute Power, Montrose, Co. Rare plant inventory: Grand Junction,  
Co.
- 1982 Endangered Plant Studies, Orem, Ut. Frontier Exploration, Billing Mt. Rare plant inventory: Price, Ut.
- Bio-West, Logan, Ut. BLM, Vernal, Ut. Rare plant inventory: Uinta Basin, Ut.
- Brigham Young University, Provo, Ut. Inventory for Zion Snail (*Physa zionis*). Zion Natl. History Association.
- 1979 BLM. Las Cruces, New Mexico. Rare plant inventory Sacramento Mts.
- 1978 Endangered Plant Studies, Orem, Ut. MX mussel inventory in Nevada & Utah.

#### WETLAND

- 2001 W. W. Clyde/UDOT. North Glendale Gravel Pit. Wetland determination, Kane, Co., Ut.
- Westland Construction. Springville Industrial Park delineation.
- RB&G Engineering/UDOT. Wetland delineation and mitigation. Antelope Creek, Duchesne Co. Ut.
- Natural Successions Inc. Springville, Ut. Wetland delineation. Springville Industrial Park.
- Meadow Valley Construction, Salina, Ut. Wetland determination.
- Utah Division of Wildlife Resource. Wetland delineation. Springville Fish Hatchery.
- Utah Division of Wildlife Resources. Wetland delineation. Provo Sportmans Access.
- Sear-Brown/UDOT. American Fork Park & Ride delineation and hydrological monitoring.
- 2000 HDR/UDOT, Ut. Springville Interchange wetland delineation and mitigation.
- W. W. Clyde. Springville, Ut. Sportmans Park Trail wetland determination. Park City, Ut.
- W. W. Clyde. Springville, Ut. Wolf Creek Gravel Pit determination. Summit Co, Ut.
- Utah County Rural Housing Development. Provo, Ut. Dry Creek subdivision delineation.
- Shady Glen Subdivision, Riverdale, Ut. Wetland delineation.
- RB&G Engineering, Provo, Ut. Spanish Fork Canyon wetland delineation & mitigation.
- 1999 HDR Engineering, Salt Lake City. Vaughn Burbridge delineation. Park City, Ut.

Michael Baker Jr., Salt Lake City, Ut. Wetland delineation fiber optic line-Colo-Ut

Colliers-CRG, Salt Lake City, Ut. Wetland delineation. Farmington Ut.

HDR& Pic-Tech, Denver, Co. Wetland delineation. DM&E Railroad, Wyo. & S. Dakota.

W. W. Clyde. Springville, Ut. Wetland determination. Trapper Loop Snowbasin Rd.

W. W. Clyde. Springville, Ut. Wetland determination-Gravel Pit Green River, Ut.

4-H Construction, Odgen, Ut. Wetland delineation.

Williams Corp. Salt Lake City. Wetland delineation. Mancos Loop project. Mancos, Co.

1998 Pic-Tech, Denver, Co. Wetland delineation. Paiute Natural Gas Line from Wells to Elko, Nv.

Doug Holmes, Blue Sky Ranch, Heber, Ut. Wetland delineation.

Pic-Tech, Denver, Co. Wetland delineation. Northwest Pipeline. Twin Falls to Wells, Nv.

Diversified Habitats. Salt Lake City, Ut. Wetland delineation. Farmington, Ut.

Tiffany Development Co. Wetland delineation and mitigation. Roy, Utah.

Robert Nelson Construction, Salem, Ut. Wetland delineation.

EPG, Draper, Utah. Wetland delineation. Toshiba Development Project.

1997 Issac Springs Development, Riverdale, Ut. Wetland delineation and mitigation.

Springville City Co., Ut. Wetland delineation. Springville Industrial Complex.

HDR & Baseline Data, Inc. Orem, Ut. Legacy Highway. Wetland delineation team.

Alco Group, Spanish Fork, Ut. Wetland delineation.

Engineering Planning Group, Draper, Ut. Wetland delineation. Toomb Development, Provo, Ut.

Engineering Planning Group, Draper, Ut. Wetland delineation. Jordan River-Palmer.

Engineering Planning Group, Draper, Ut. Wetland delineation. Ogden Subdivision.

1996 Pic-Technologues, Denver, Co. Northwest Pipeline. Evanston pipeline delineation.

Engineering Planning Group, Draper, Ut. Wetland delineation. Willow Creek Park, Lehi, Ut.

Springville City Co. Springville, Ut. Wetland delineation. Springville Industrial Complex.

Engineering Planning Group, Draper, Ut. Wetland delineation. Springville City, Ut.

Engineering Planning Group, Draper, Ut. Wetland delineation. Genola, Ut.

Engineering Planning Group, Draper, Ut. Wetland delineation. Macy's, Spanish Fork, Ut.

new lease area.

- 1984 Endangered Plant Studies, Orem, Ut. Coastal State Energy Co. Monitoring and revegetation at Skyline Mine.
- 1983 Mt. Nebo Scientific, Springville, Ut. Vegetation/ soil inventory: Diamond Shamrock Mine, Emery Co., Ut.  
Mt. Nebo Scientific, Springville, Ut. Vegetation/soil inventory: Horse Cyn. Mine. Sunnyside, Ut. U.S. Steel Corp.
- 1982 Utah International, Farmington, N. M. Soil/ vegetation inventory at San Juan and Navajo Mines.  
Biowest, Logan, Ut. Reclamation plan for Riley Ridge Natural gas expansion. Wyoming.
- 1979 Endangered Plant Studies & NPI, Salt Lake City, Ut. Vegetation sampling and monitoring: Alaska pipeline: Prudoe Bay to Fairbanks to Tok.
- 1977-78 BLM, Moab District Office. Range technician. Vegetation mapping and sampling (SVIM).  
BLM, Glenwood Sps., Co. Range technician. Vegetation mapping and sampling (SVIM).
- 1976 Brigham Young University and Dow Chemical Co. Gambel oak control.

#### **PUBLICATIONS**

5 scientific publications and 100 non-refereed reports.

#### **PROFESSIONAL AFFILIATIONS**

Society of Wetland Scientists, Natural Areas Assoc., Utah & Wyoming Native Plant Society.

#### **CERTIFICATIONS**

Nationwide Permit Workshop, Cleveland, OH. Wetland Training Institute, 2000.  
Advanced Problems in Hydric Soil, North Carolina State University, 2000  
Professional Wetland Scientist, Society of Wetland Scientists, 2000.  
Habitat Evaluation Procedures, Phoenix AZ. USFWS 1995.  
Southwestern Willow Flycatcher Survey Techniques, St. George UT. USFWS 1995, 1998.  
Wetland Training Institute, Advanced Wetland Delineation, Charleston, SC. 1992.  
Black Footed Ferret Survey Techniques, USFWS, 1990.

## **Exhibit D**



Forest Service  
Intermountain Region  
Ogden, Utah



National Park  
Service  
Utah



Bureau of Land  
Management  
Salt Lake City, Utah



Utah Natural Heritage  
Program  
Salt Lake City, Utah



U.S. Fish and Wildlife  
Service  
Salt Lake City, Utah

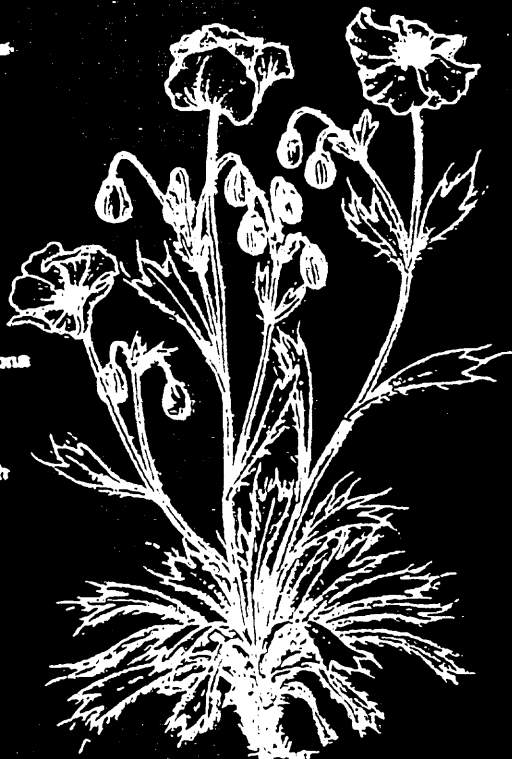
Environmental  
Protection Agency  
Region 8  
Denver, Colorado

NAVAJO NATION  
Navajo Natural  
Heritage Program  
Window Rock, Arizona

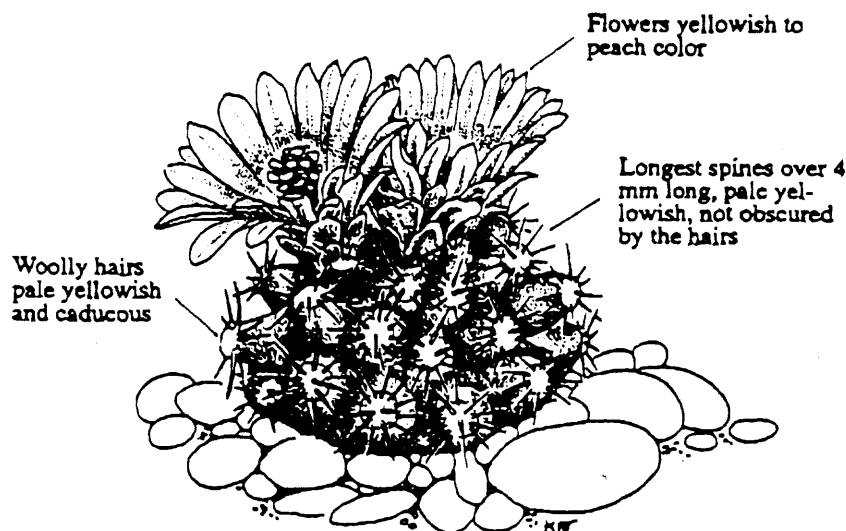
SKILL VALLEY  
GOSHUTE TRIBE  
Salt Lake City, Utah

## UTAH

# Endangered, Threatened and Sensitive Plant Field Guide



*Arctomecon humilis* (Dwarf Harebell Poppy), Washington County, Utah.  
Illustration by Kaye F. Thorne



Small depressed-hemispheric plants 3.8-6 cm tall

### ***PEDIOCACTUS DESPAINII***

**Scientific Name:** *Pediocactus despainii* Welsh & Goodrich

**Common Name:** Despain Footcactus

**Family (Common Name):** Cactaceae (Cactus Family)

**Synonyms:** None

**Global Distribution:** Endemic to Central Utah in Emery County

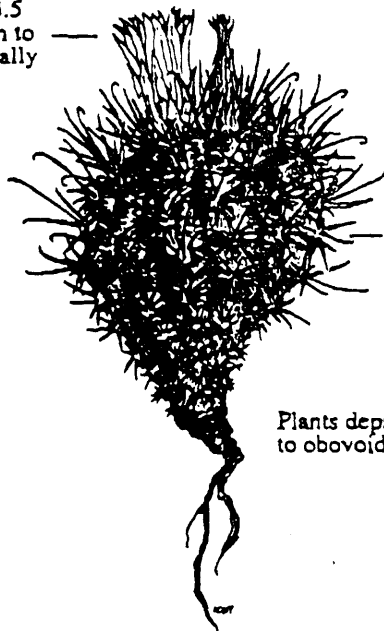
**Management Responsibility:** Capitol Reef NP and BLM-Moab and Richfield District

**Habitat:** Open pinyon-juniper community on limestone gravels at 6,000-6,200 feet elevation, late April-early May.

**Look-alikes:** Related to *P. winkleri*, but distinguished from it by having the longest spines over 4 mm long, these pale yellowish and not obscured by the hairs, woolly hairs pale yellowish and caducous, with yellowish to peach colored flowers.



Flowers small, 2-3.5  
cm long, yellowish to  
pink or white dorsally



Spines short, 2.5 cm  
long or less

Plants depressed-hemispheric  
to obovoid, 6-12 cm high

### ***SCLEROCACTUS WRIGHTIAE***

---

**Scientific Name:** *Sclerocactus wrightiae* Benson

**Common Name:** Wright fishhook cactus

**Family (Common Name):** Cactaceae (Cactus Family)

**Synonyms:** *Pediocactus wrightiae* Cronq.

**Global Distribution:** Emery and Wayne counties in southcentral Utah

**Management Responsibility:** BLM-Moab and Richfield Districts, Capitol Reef NP, State Trust Lands, and private

**Habitat:** Salt desert shrub to the juniper community at 4,790-6,120 feet elevation on the Mancos Shale Formation, April-May.

**Look-alikes:** Easily separated by its small flowers (2-3.5 cm long) and short spines, but resembling *S. mesae-verde* and *S. whipplei*.

## **Exhibit E**

• UTAH

*Wilderness  
Inventory*



1999

U.S. Department of the Interior • Bureau of Land Management



# Desolation Canyon

## Findings

### INVENTORY UNIT ACRES

Federal	State	Total
<b>With Wilderness Characteristics</b>		
182,320	28,900	211,220 (97%)
<b>Without Wilderness Characteristics</b>		
5,700	0	5,700 (3%)
<b>Inventory Unit Total</b>		
188,020	28,900	216,920
<b>Contiguous Area Wilderness Characteristics</b>		
Desolation Canyon WSA (UT-060-068A)		290,845
Floy Canyon WSA (UT-060-068B)		72,605

About 211,220 acres of the nine Desolation Canyon inventory units have wilderness characteristics. These units are a continuation of the many features and landforms found throughout the contiguous Desolation Canyon Wilderness Study Area (WSA) and enhance its magnificent wilderness qualities. In combination with the WSA, the nine units represent one of the largest blocks of roadless BLM public lands within the continental United States. This is a place where a visitor can experience true solitude—where the forces of nature continue to shape the colorful, rugged landscape.

Approximately 5,700 acres in three places along the fringe of the inventory units are unnatural and do not have wilderness characteristics.

The Floy Canyon and Desolation Canyon inventory units are physically connected at the end of the Right Hand Tusher Canyon Road within the state section.

## Unit Description

Desolation Canyon is located in Grand, Emery, Carbon, Duchesne, and Uintah Counties. The southern boundary of the inventory unit is five miles north of Green River, Utah, while the northern boundary is located some 33 miles southwest of Vernal. The Green River bisects the unit on the north. The Uintah and Ouray Indian Reservation forms a part of the boundary

of the north end of the unit. Various roads, pipelines, and private lands form the boundaries of the remainder of the unit.

The terrain varies dramatically, from river bottoms and flood plains at about 4,200 feet elevation to the high ridges of the Tavaputs Plateau at 9,500 feet. Numerous mesas, ridges, plateaus, canyons, and deep remote drainages intersect with the Green River. The south and southwest portion of the inventory unit is defined by a 32-mile portion of the Book Cliffs. The units contain a wide diversity of vegetation, ranging from riparian zones along the river, to piñon and juniper woodlands; areas dominated by saltbush/sagebrush/ shrubscale plant communities; and high ridges and plateaus forested with aspen, spruce, and fir.

Recreation is a dominant use with some 7,000 boaters a year floating the Green River through Desolation Canyon. Many more recreationists utilize the accessible lower stretch of Gray Canyon for camping, fishing, hiking, and water sports. Hunting and sightseeing occur in outlying areas along the boundaries. Some cattle grazing takes place, and remnants of past oil and gas exploration are also present.

## Wilderness Characteristics

### Naturalness

Nearly all of the inventory units appear natural. While there are many scattered human imprints, their individual and cumulative impact on the natural character of most of the inventory units is minor. The imprints are in various stages of rehabilitation, with most being substantially unnoticeable in the area as a whole. The expansive landscape, diverse topography, and vegetation screens the scattered human intrusions within the units. Minor remnants of past oil and gas exploration, livestock grazing, and recreation pursuits remain, but most disturbance has been erased over time by the forces of wind, water and vegetation regrowth. Most of the significant or noticeable intrusions are located outside the boundaries.

Three areas do lack natural character. A small area in Unit 1 on the northern boundary near Fourmile Wash and Fourmile Bottom on the Green River lacks naturalness because of roads, old seismic lines, and reclaimed drill pads. Two small areas in Unit 3 also lack naturalness because of extensive off-highway vehicle use.

## Outstanding Opportunities

### Solitude

All nine units are contiguous to Desolation Canyon WSA and enhance the outstanding opportunities found in the WSA. Units 1 and 7 are of sufficient size and configuration to provide outstanding opportunities for solitude on their own. All of the units, together with the Desolation Canyon WSA, comprise a large remote area where a visitor is truly isolated from the outside world. The vast size, configuration, numerous scenic vistas, diversity of vegetation, and rugged topography provide the visitor with numerous places and opportunities to become isolated from others. Most of the units are remote, accessible only by foot, horseback, or boat.

## Primitive and Unconfined Recreation

The inventory units are contiguous to and are an extension of the Desolation Canyon WSA. They enhance the outstanding opportunities provided by the WSA, including multiple-day river float-boating trips in a primitive setting, hiking, hunting, horseback riding, backpacking, back-country camping, climbing, fishing, swimming, photography, viewing of cultural and historic sites as well as a diversity of wildlife, nature study, and viewing of scenic landscapes. The large size and configuration of this vast, wild area enhances the variety and extent of activities available.

## Supplemental Values

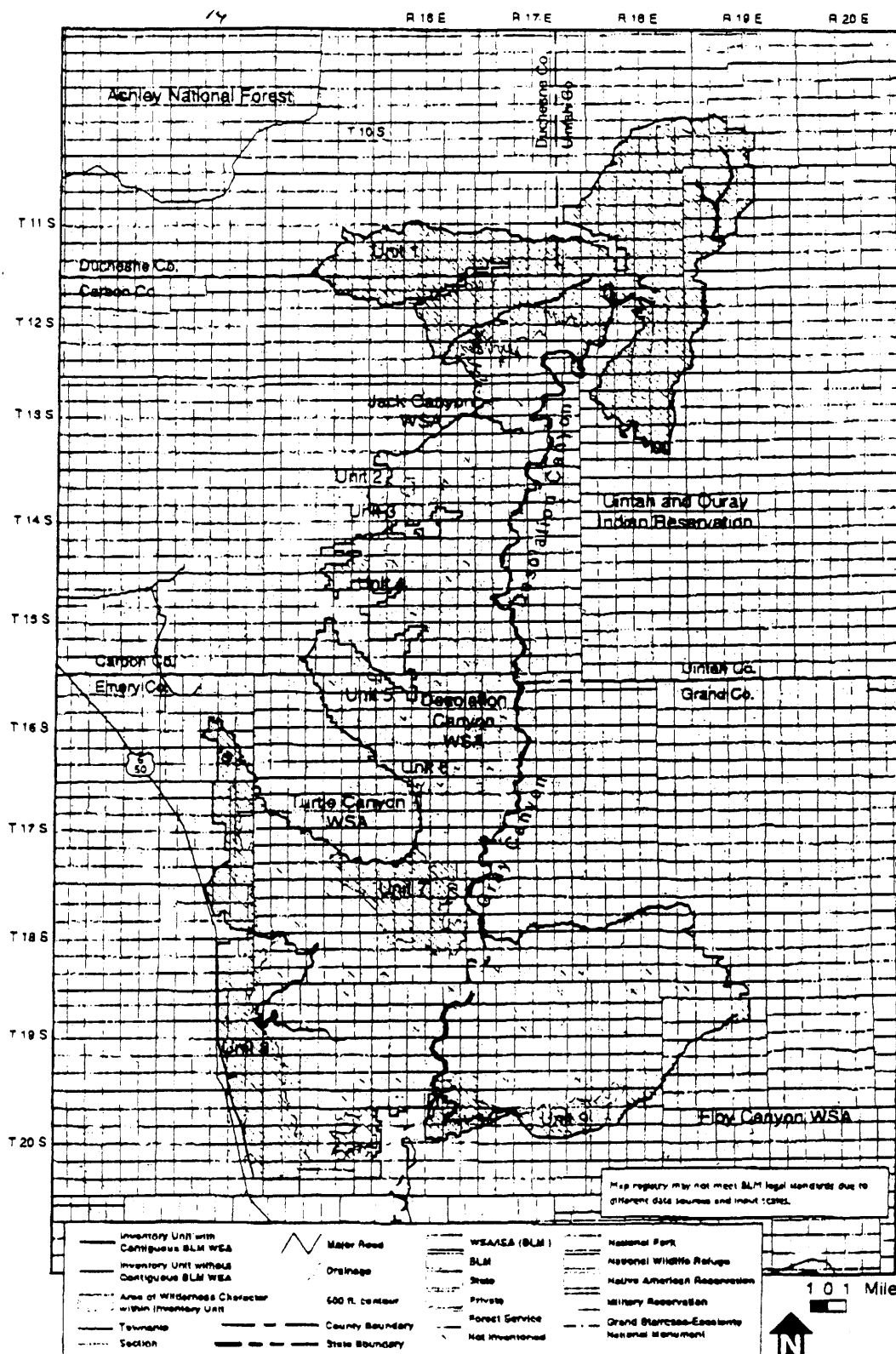
The inventory unit contains cultural, scenic, geologic, botanical, and wildlife values. Elevations and topography in the units vary from desert canyons to high mountain environments. Vegetation and wildlife habitats and species also vary greatly because of the diversity of terrain. Six endangered animal species occur or may occur in the units, including the peregrine falcon, black-footed ferret, bald eagle, Colorado squawfish, humpback chub, and bonnytail chub. Ten special status animal species and six special status plant species also occur or may occur in some of the units.

**DESOLATION CANYON—**  
The Green River flows by Nutter's Hole through Desolation Canyon; the inventory unit is on the right side of the river.



BLM photo

## Desolation Canyon



NORTHEAST REGION—Desolation Canyon

# Turtle Canyon

## Findings

### INVENTORY UNIT ACRES

Federal	State	Total
<b>With Wilderness Characteristics</b>		
4,860	3,860	8,720 (100%)
<b>Without Wilderness Characteristics</b>		
0	0	0 (0%)
<b>Inventory Unit Total</b>		
4,860	3,860	8,720
<b>Contiguous Area-Wilderness Characteristics</b>		
Turtle Canyon WSA (UT-060-067)		33,690

All five Turtle Canyon inventory units (8,720 acres) have wilderness characteristics when considered in conjunction with the contiguous Turtle Canyon Wilderness Study Area (WSA). The units appear to be in a natural state, affected primarily by the forces of nature. A few short vehicle ways exist near the boundary, but they are in various stages of reclamation through erosional processes and revegetation, and thus do not significantly impact the natural character of the units. The scenic, steep, and jagged topography and dense vegetation provide outstanding opportunities to experience solitude and to engage in a variety of primitive and unconfined recreation activities. The inventory units also contain cultural, wildlife, and scenic values.

## Unit Description

The Turtle Canyon inventory units are located about eight miles southeast of Sunnyside. They are on a divide between the Little Park Plateau above the Book

Cliffs to the west and Range Creek Canyon to the northeast. The units are contiguous to and extend the landforms of the Turtle Canyon WSA, an extremely steep and rugged area cut by canyons that are 1,000 to 3,000 feet deep. Elevations range from 4,800 feet in Turtle Canyon to 9,327 feet south of Little Horse Canyon near the head of Bear Canyon in the WSA. Vegetation is predominantly piñon and juniper woodland, with Douglas fir and mountain shrub communities scattered along the higher elevations and northern slopes. Much of the area has colorful rock outcrops of reds, greens, yellows, and grays. Uses of the units include coal exploration, cattle grazing, hunting, and hiking.

## Wilderness Characteristics

### Naturalness

The intrusions within the inventory units are widely scattered and related to reaching and coal exploration drilling. All of these intrusions are minor, have been reclaimed or are in various stages of natural rehabilitation, are well screened by vegetation and topography, and are substantially unnoticeable. The units appear to be in a natural state, affected primarily by the forces of nature as perceived by the average visitor on the ground.

## Outstanding Opportunities

### Solitude

The inventory units possess outstanding opportunities for solitude because they

are contiguous to and are extensions of the Turtle Canyon WSA, which provides outstanding opportunities for solitude. The steep and rugged terrain, numerous side canyons, and piñon and juniper woodlands all provide ample screening. Scenic views within the canyons and from the ridgetops enhance the feeling of being isolated and alone.

## Primitive and Unconfined Recreation

The inventory units are contiguous to and are extensions of the Turtle Canyon WSA, where opportunities for primitive and unconfined recreation are outstanding. The WSA provides opportunities for hiking, climbing, camping, hunting, and sightseeing. These opportunities are outstanding because of the size and configuration of the WSA as well as the quality of the scenic, geologic, wildlife, and cultural features. The contiguous inventory units enhance and extend the primitive and unconfined recreation opportunities found within the Turtle Canyon WSA.

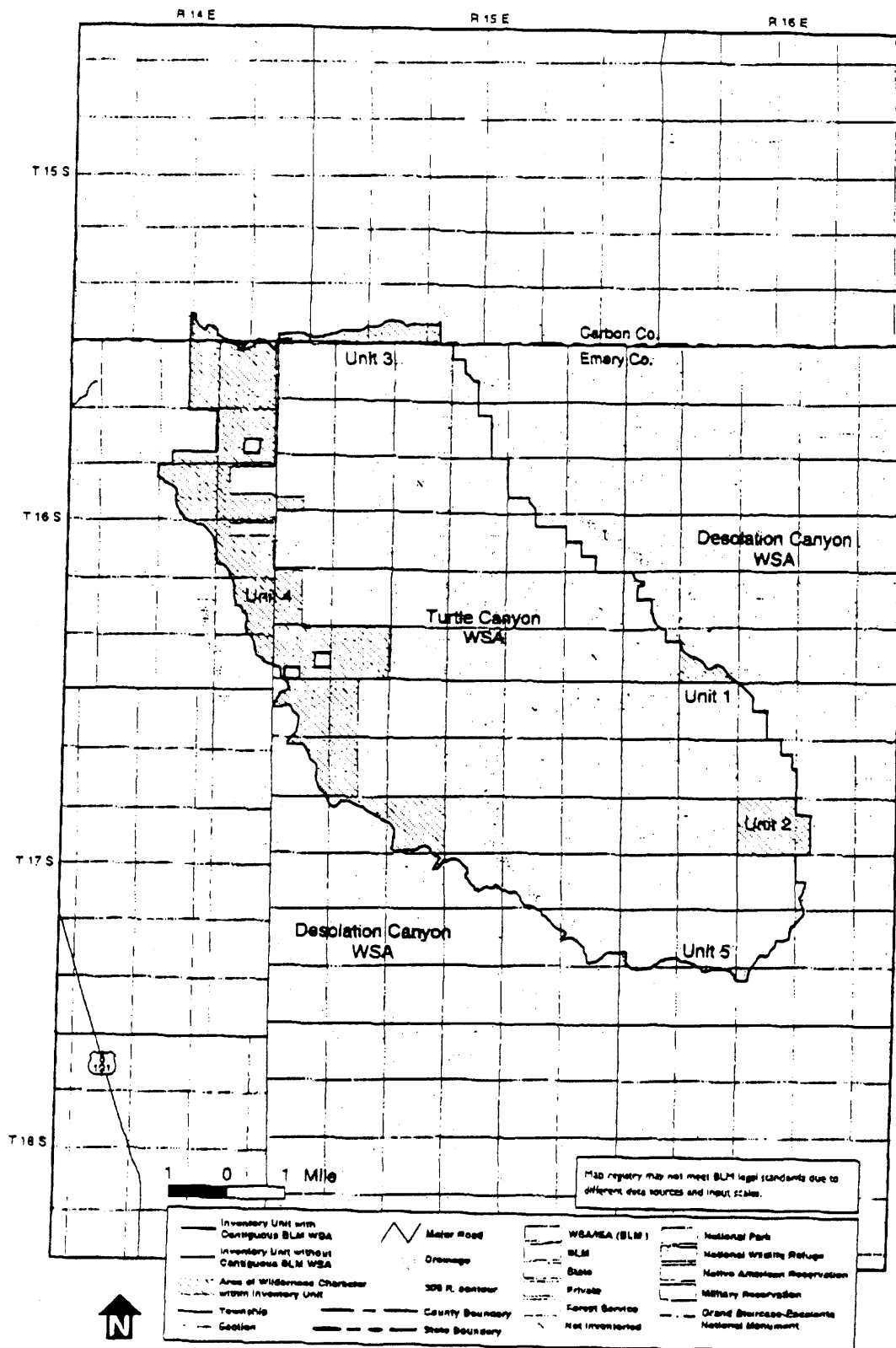
## Supplemental Values

The WSA and inventory units have outstanding scenic quality, and significant Fremont period artifacts could be present. There are populations of mountain lion, elk, Rocky Mountain bighorn sheep, and black bear. Endangered peregrine falcons and bald eagles may frequent the area; six other special status animal species and three plant species could be present as well. Overall, the differences in terrain and vegetation and the variety of wildlife and wildlife habitat that exist here are seldom found in an area the size of the Turtle Canyon WSA.

TURTLE CANYON—Varied landforms and vegetation extend the outstanding opportunities for solitude found in the Turtle Canyon WSA into the inventory unit.



# Turtle Canyon



NORTHEAST REGION—TURTLE CANYON